Lexington Town-wide Bicycle and Pedestrian Plan

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PREPARED FOR:

Town of Lexington MA

PREPARED BY:

With James Tasse Consulting

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Lexington Select Board

- Joe Pato, Chair
- Suzie Barry, Vice-chair
- Jill Hai
- Doug Lucente
- Mark Sandeen

Town Manager James J. Malloy

Transportation Safety Group (TSG)

TSG Staff

- Sheila Page, Planning Office
- Ross Morrow, Engineering Division
- Matt Weisman, Engineering Division
- Chris Barry, Police Department
- Susan Barrett, Transportation Services
- Mary Canavan, School Transportation
- Elaine Celi, School Transportation
- David Coelho, School Department

TSG Advisors

- Peggy Enders, Greenways Corridor Committee
- John Rossi, Commission on Disability
- Pamela Lyons, Transportation Advisory Committee
- Ram Reddy, Bicycle Advisory Committee

TSG+ Advisory Group

All of the TSG above plus:

- Melissa Battite, Recreation & Community Programs
- Karen Mullins, Conservation Office
- Amber Carr, Conservation Office
- Maggie Peard, Sustainability & Resiliency Office
- Jonathan Schwarz, Transportation Advisory Committee
- Mike O'Connor, Bicycle Advisory Committee
- Bob Moshiri, Greenways Corridor Committee
- Mark Andersen, Transportation Advisory Committee

Consultant Team

- Patricia Domigan P.E., Principal (VHB)
- Phil Goff AICP, Project Manager (VHB)
- Daniel Amstutz AICP, Project Planner (VHB)
- Jim Tasse (James Tasse Consulting)

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Vision Statement

Lexington seeks to encourage and support walking and bicycling for recreation and as attractive alternatives to automobile-based transportation to improve access for all ages and abilities and to improve the experience and quality of life for residents and visitors.

Recognizing that walking and bicycling face significant challenges within today's infrastructure, the Town is committed to a process of evaluation, investment, and change that will make alternative transportation more attractive, accessible, and inclusive. This plan is the first step in taking concrete steps to realize this vision. It will be constrained by resources and budget, but represents an important commitment to the ongoing process. It is the first step of many.

Extension of Other Plans

The Townwide Bicycle and Pedestrian Plan (TBPP) is an extension of recently developed plans which have cited that a well-connected walking and bicycling network is key for these plans' success. Implementing this TBPP is also part of implementing the plans referenced below.

The LexingtonNext Comp Plan: Transportation & Circulation Goal states: *"To make traveling into, out of, and within Lexington safe, pleasant, and efficient with sustainable and equitable mobility options for all ages and abilities."* with the specific objective: *"Expand options for walking, biking and micro-mobility."*

One of the Climate Action and Resilience Plan's goal states: *"Lexington residents take fewer car trips because there are sustainable and accessible mobility options for all ages and abilities"* with the specific objective: *"Expand safe options for walking, biking and rolling through road, streetscape and bicycle trail improvements".*

One of the Open Space and Recreation Plan's goals states: *Expand upon and create new opportunities for bicycling and walking throughout Lexington.*

Additionally, the Age-friendly Initiative says *"Being able to get where one wants and needs to go helps people maintain social ties, obtain needed goods and services, access local amenities and be engaged with the community. Ensuring that people have access to adequate travel options within and around their community, including walking, bicycling, driving, and taking public transportation, is part of creating a livable community."*

Executive Summary

The Town-wide Bicycle and Pedestrian Plan identifies current and desired conditions for bicycling, walking, and rolling in Lexington. The first of its kind for Lexington, the plan is an action-oriented document designed to help bridge the gap between current conditions and what residents envision for safe, comfortable, and connected bicycle and pedestrian network and the policies and programs that support them.

ES.1 Introduction

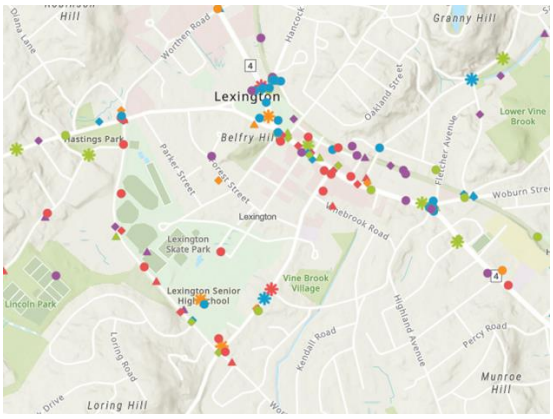
Development of the Town-wide Bicycle and Pedestrian Plan (TBPP) involved an assessment of existing conditions for walking and bicycling, analysis of crash locations, and a review of the Town's current plans, policies, and reports. In aggregate, these helped the consultant team to develop the TBPP that is consistent with, and complements, the current Comprehensive Plan, the Open Space and Recreation Plan, the Vision Zero Action Plan, the Lexington Age-Friendly Report, and others. The nearly year-long planning process included a robust public engagement effort that strongly informed the TBPP's recommendations.

Summary of Public Engagement

The plan's public outreach and engagement featured interviews with key stakeholders, bi-monthly meetings with the pre-established Transportation Safety Group "+", three public meetings, and an on-line survey which included a community-input mapping tool.

- **Stakeholder Outreach** included meetings with the Transportation and Bicycle Advisory Committees, Friends of the Lexington Bikeways, Safe Routes to School advocates, the Conservation Commission, the Greenways Corridor Committee, the Council on Aging, Commission on Disability, Sustainable Lexington, and high school students.
- The **Transportation Safety Group+** included Town staff, committee representatives, and advocates and met bi-monthly to help guide the public process and the consultant's technical work.
- **Public Meetings** drew roughly 100 people to the three events held on April 4 (Lexington Community Center), June 8 (Cary Hall), and November 1 (Estabrook Hall); the resulting discussions were critical for the formulation of the project and program recommendations, and the subsequent prioritization.

- The **Online Survey** garnered 374 responses to the 17 questions relating to walking/bicycling habits, perceived barriers, desired improvements, and priorities to improve bicycling, walking, and rolling.
- The **Online Input Map** supplemented the survey and induced hundreds of suggested locations for new and improved facilities coded by project type: new/improved crosswalk, new/improved path or trail, and new/improved sidewalk.



Portion of the Online Input Map focused on Lexington Center, Worthen Road, and LHS

Town-wide Bicycle and Pedestrian Plan Goals

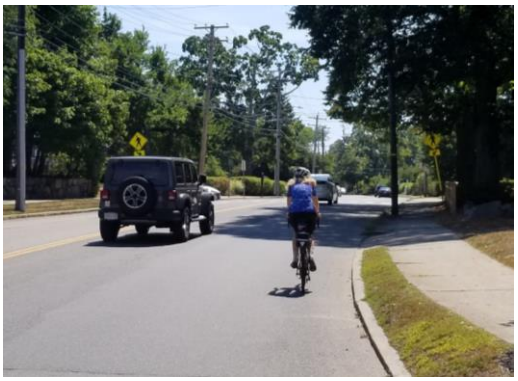
Five goals were used to guide the TBPP's network-planning, bicycle/ pedestrian facility concepts, and the program recommendations. They were also used as the foundation of the evaluation criteria used to prioritize project recommendations.

- SAFETY: increase bicyclist and pedestrian safety with programs and infrastructure projects
- CONNECTIVITY: link neighborhoods with schools, business districts, bus stops, parks, playgrounds, conservation and open space and adjacent communities and the Town's existing network of paths, bikeways, and sidewalks
- DESIGN: encourage bicycling and walking with separated/protected facilities designed for all ages and abilities
- ECONOMY: promote local businesses and sustainable tourism with strategic bicycle and pedestrian investments
- FEASIBILITY: plan for project recommendations that minimize engineering challenges, can leverage funding opportunities, and build community support

ES.2 Summary of Key Recommendations

The evaluation of current conditions, review of existing policies, plans, and reports, and community feedback from multiple sources, helped the planning team identify bicycle and pedestrian safety and connectivity needs in Lexington. The most critical needs include:

- Better connected trails with emphasis on the gaps along the Lower Vine Brook route and missing links to the Minuteman Bikeway
- Mitigating fragmentation of the on-street bicycle network, especially along Marrett Road, Mass Ave, and near LHS
- Reducing speed of traffic on roadways well used by pedestrians and bicyclists and in some residential areas
- Fixing well-worn sidewalks and eliminating gaps in the network
- Improving and striping new crosswalks near schools, parks, conservation lands, and in retail business districts



Lack of bike lanes on parts of Mass Ave form critical gaps in the Lexington's bicycle network

Accommodating bicycle and pedestrian safety and connectivity needs requires improvements to the bicycle, pedestrian, and trail networks in Lexington. The TBPP includes hundreds of recommendations that eliminate network gaps, improve safety, and provide links to destinations such as schools, business districts, parks, transit stops, places of employment, and historic sites.

Bicycle and Shared Use Path Network

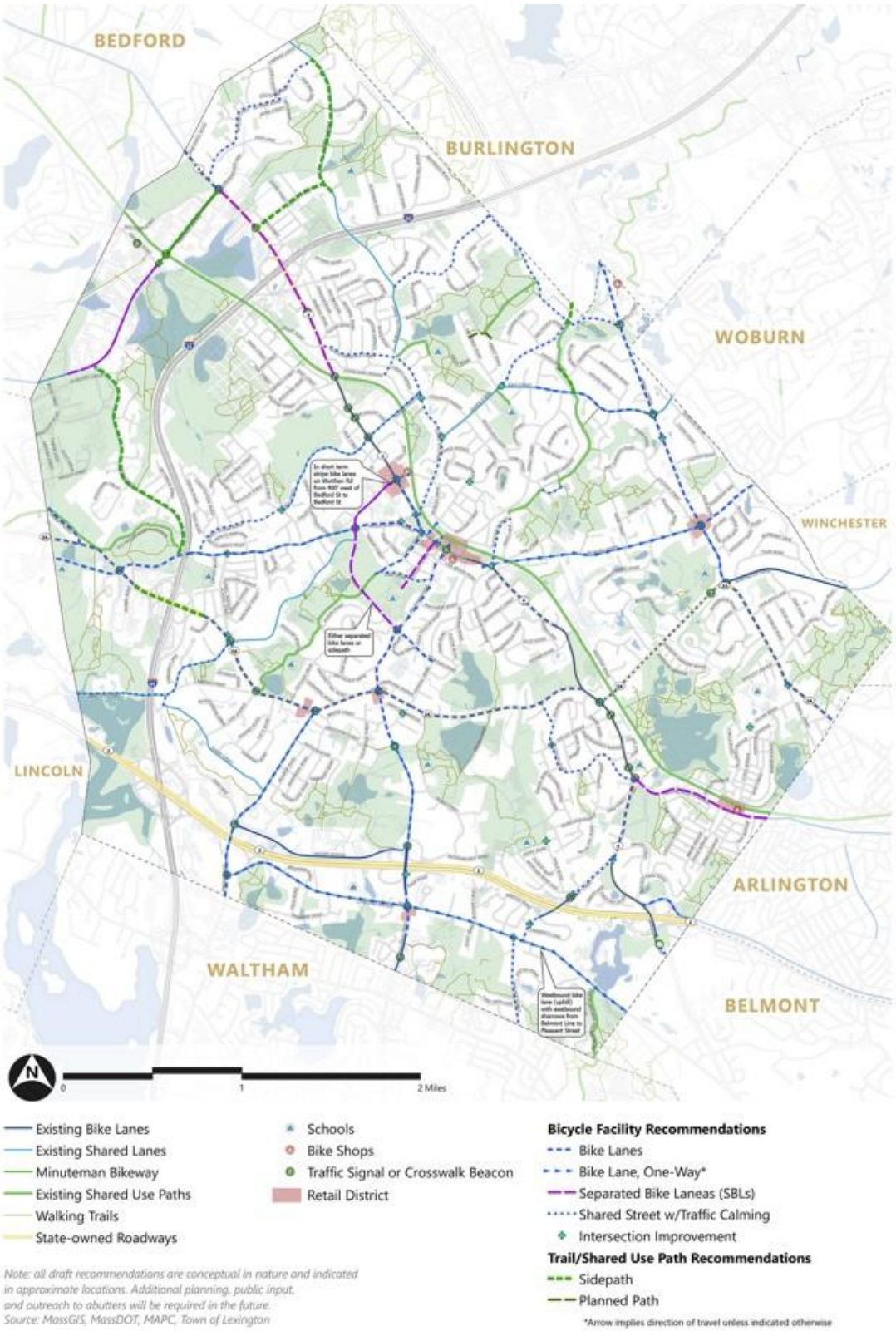
The recommended bicycle network as shown in Figure 1 features shared use paths (through open space and within road rights of way), roadways with shared lanes (some with traffic calming measures) and striped bicycle lanes. The latter features separated bicycle lanes, standard 5-foot-wide lanes in both directions, and one-way uphill climbing lanes. In most cases, the one-way bike lanes are intended to be short-term improvements where roadway width precludes bike lanes on both sides of the roadway, e.g., Concord Avenue or Woburn Street. Many of the bike lane recommendations can be incorporated into scheduled roadway maintenance and/or repaving projects with minimal additional funding.

Summary of Network Recommendations

- 23 miles of new standard and separated bike lanes
- 11.5 miles of shared roadways with traffic calming
- 34 improved intersections
- 10 miles of new and improved trails and paths
- 20.5 miles of new and improved sidewalks
- 60 new and improved crosswalks

The network recommendations include several discrete improvements at intersections intended to improve safety and access for bicyclists and pedestrians. This ranges from tightening corner turning radii to slow traffic, to striping green bike crossings adjacent to crosswalks, to a full reconstruction to simplify the intersection geometry and/or dramatically reduce bicycle/pedestrian crossing distances.

Figure ES-1 Bicycle Facility Recommendations



Pedestrian and Trail Network

The recommended pedestrian network as shown in Figure 2 is comprised of walking trails and paths through public open space—primarily managed by the Lexington Conservation Commission—new and improved sidewalks, new and improved crosswalks, and various intersection improvements. The latter includes tightening corner turning radii to slow traffic, adding corner bump outs, or a full reconstruction to square off intersections, simplify the intersection geometry, and/or dramatically reduce pedestrian crossing distances. Although final designs are left open to engineering evaluation and public safety needs, crosswalk-related recommendations include anticipated pedestrian safety countermeasures[1] such as:

- Raised crosswalks (or speed humps immediately adjacent)
- Curb extensions/bump outs
- Median refuge islands
- Rectangular rapid flashing beacons (RRFBs)
- Enhanced lighting

Example of crosswalk recently improved with a median island, bump outs, and RRFBs in Medford

Bicycle/Pedestrian Programs

The TBPP includes recommendations for improved and new policies and programs that support access and safety for pedestrians and bicyclists. Based on the six "E's"—Engineering, Encouragement, Education, Enforcement, Equity, and Evaluation—the following policy and program recommendations are to be implemented.by

- Engineering (Design and Maintenance)
  - Maintain safe pedestrian and bicycle access through construction zones
  - Provide warning signs and pavement markings at discontinuous bike lanes and some intersections
  - Create a mobile app for reporting maintenance issues
  - Enhance winter maintenance policy to prioritize demand by all modes, not just drivers
  - Expand winter maintenance beyond the Minuteman Bikeway to other Town path particularly nears schools
  - Consider requiring abutters to remove snow and ice from sidewalks
- Encouragement
  - Promote walking and bicycling locally with more online information and maps
  - Initiate a roadway user courtesy program

[1] Selection of the appropriate treatments is based on a variety of factors including the land use context, street width, number of travel lanes, and the speed and volume of roadway traffic. See also: https://safety.fhwa.dot.gov/provencountermeasures/

- Designate a family-friendly bicycle loop within Lexington through signage
- Provide incentives for Town staff to use active transportation modes to work
- Ensure plentiful and covered bicycle parking is available at all public schools
- Require minimum bike parking for all new development projects
- Create modern bicycle parking guidelines that include e-bikes and charging
- Encourage artistic bike rack designs within the public ROW

› Education
- Continue to foster school-based walk-to-school and bike-to-school programs
- Continue to promote free giveaways for bicycle safety equipment at community events
- Continue to promote bicycle maintenance courses for adults
- Create additional roadway safety education materials for all road users
- Install pedestrian and bicycle wayfinding signage to local destinations

› Enforcement
- Consider decoy operations to promote crosswalk stopping compliance
- Consider decoy operations to enforce motor vehicles laws near schools
- Require side guards and enhanced mirrors on Town trucks to improve safety
- Implement traffic calming in key locations

› Equity
- Encourage developers to create more pedestrian and bicycle infrastructure for projects in the new multi-family residential zones.
- Connect all neighborhoods to the Center and transit opportunities

› Evaluation
- Develop performance metrics appropriate to Lexington.
- Develop regularly scheduled pedestrian and bicycle counts beyond the Minuteman Bikeway to include other paths, roadways such as Mass Ave and at schools
- Conduct walk/bike safety audits with students and staff at all schools.

As part of the TBPP, the planning team also explored ways for the Town of Lexington to address challenges related to the increasing use of electric-assist bicycles and scooters (aka E-micromobility). A summary of potential policies to promote safety for both E-micromobility users and those who interact with them—i.e., pedestrians on the Minuteman Bikeway—include these recommendations:

› Since E-bikes and E-scooters are already regulated under Massachusetts state law, they should be allowed on all public ways open to bicycles including the Minuteman Bikeway.

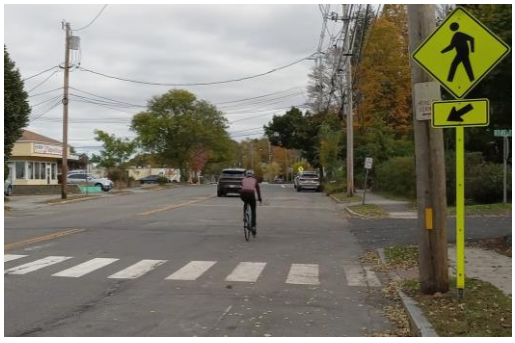
› Creating educational signs, handouts, stickers, web assets, etc. will highlight behaviors the Town of Lexington would like to see practiced by E-micromobility users.

- Continue to foster an expectation of reasonable behavior and speeds on the Minuteman Bikeway through the practice of community engagement and good riding behavior.
- Revise the current "No Motor Vehicles" signs at trailheads and intersections along the Minuteman Bikeway to explicitly allow for E-micromobility.
- Explore additional ways to regulate E-micromobility through coordination with other Minuteman Bikeway communities, the State and by looking at what other U.S. cities such as Boulder, CO have done to improve interactions between E-micromobility users and pedestrians and bicyclists.

Figure ES-2 Pedestrian Facility Recommendations

ES.3 Project Prioritization

To help the Town of Lexington prioritize the 298 bicycle, pedestrian, and trail facility recommendations, the TBPP used 12 criteria to score and rank them. The results of the Prioritization process should inform project funding and future implementation of the facility recommendations. Coordination with Public Works' regular repaving and repair program and roadway corridor projects programmed into the Town's Capital Budget should be noted.



Mass Ave in East Lexington included a handful of high-ranking recommendations for both pedestrian and bicycle facilities.

Evaluation Methodology

The methodology used included a multi-step process:

- Establishment of 12 evaluation criteria—both quantitative and qualitative—based on the TBPP's five goals (see Table 1)
- Each criterion was "weighted" based on the Town's priorities
- Scores from 0-15 were provided for project recommendations based on the quantitative (per geographic data) and qualitative (per planning team judgment) scoring rubric

Table ES-1 Evaluation Criteria

Plan Goals	Criteria (up to 5 points each) ***Note: qualitative criteria shown in Italics***	Weighting	Max. Weighted Point Total
1: SAFETY	Proximity to reported bicycle/pedestrian crashes	2	10
	Motor vehicle volume along roadway	2	10
2: CONNECTIVITY	*Addresses a key gap in the trail/bicycle/pedestrian network*	1	5
	Proximity to public or private school (K-12)	3	15
	Proximity to public park or conservation land entrance	2	10
	Proximity to transit line (MBTA or Lexpress)	2	10
3: DESIGN	*Recommendation promotes "all ages and abilities" by providing separation from motor vehicles*	2	10
4: ECONOMY	Proximity to retail districts	2	10
	Proximity to tourist/cultural destination	1	5
5: FEASIBILITY	*Level of engineering complexity*	2	10
	Impact to existing on-street parking	2	10
	Level of expressed community support	1	5
	TOTAL		**110**

Using this prioritization methodology, scores were given to all 298 bicycle and pedestrian facility recommendations in the TBPP. The ranked order of recommendations broken into five categories—

on-road bicycle facilities, intersections, sidewalks, crosswalk, and trail/shared use path recommendations can be found in the full report.

ES.4 Implementation Strategy

The recommendations developed for the TBPP represent a major investment in active transportation infrastructure in Lexington that could not happen without a strong implementation strategy that includes high-level cost estimates, performance measures, and the individuals and groups—including MassDOT for the state roads in Lexington—who will take the lead on implementation.

Performance Measures

Performance Measures are data-driven benchmarks intended to help the Town gauge progress towards the TBPP's five goals. They also help the Town departments and commissions communicate successes and challenges and motivate community and political leaders to take further action. By nature, they are aspirational and intended to 'push the envelope' to encourage moving ahead more aggressively to improve active transportation safety and accessibility in Lexington. To achieve success, serious consideration of additional funding for implementation and maintenance will be needed, affecting the five-year Capital Plans for a handful of departments, especially Public Works.

Table ES-2 Performance Measures[2]

Plan Goals	Performance Measure	3-and-8 Year Targets		Lead Agencies/ Groups
		2027	2032	
1: SAFETY	Reduction in bicycle and pedestrian-involved crashes. *This metric does not account for how safe people feel	25%	50%	Planning Department, Police and TSG.
	Number of crosswalks enhanced with pedestrian safety countermeasures (new or existing)	6	16	Public Works, Planning Department, and TAC
	Reduction of reports of nears misses (This data set can be created through online mapping. Will need to develop baseline)	25%	50%	TSG/Police
2: CONNECTIVITY	Number of lane miles of new bike lanes (either standard or separated)	4 mi.	20 mi.	Public Works, Planning Department and TAC / LBAC
	Total miles of connected bike lanes increasing	2	10	Engineering, DPW, TSG
	Number of new bicycle or pedestrian safety projects (of any type) within ½ mile of a public or private K-12 school	6	24	Public Works, Planning Department, and Lex. Public Schools
	Number of new sidewalk projects that eliminate gaps in the network	10%	50%	Engineering, DPW, TSG , Commission on Disability
3: DESIGN	Number of lane miles of new separated bike lanes and/or new side paths	1 mi.	6 mi.	Public Works, Planning Department, TAC / LBAC
4: ECONOMY	Increased percentage of commuters who report walking or bicycling to work as their primary means	2.5% walk 2% bike	3% walk 3% bike	Planning Department and Economic Development

[2] Note that meeting these benchmarks could have significant impact on budget and staff capacity. Five-year Capital Plans among various departments will need to be coordinated so the Town can seize upon small and large opportunities to improve the bicycle and pedestrian network in Lexington.

	of transportation (per current ACS data, 2.2% and 1.2%, respectively)			
	The number of Lexington students riding buses to school. Currently 50% of the student body purchases bus passes	60%	80%	
5: FEASIBILITY	Annual number of temporary/pilot projects to demonstrate the effectiveness of bicycle or pedestrian improvements on a roadway	1 demo per year	1 demo per year	Public Works, Planning Department, and TSG / TAC / LBAC

TSG = Transportation Safety Group / TAC = Transportation Advisory Committee / LBAC = Lexington Bicycle Advisory Committee

1

Introduction

This report highlights the existing conditions assessment, network analysis, bicycle and pedestrian network recommendations, and prioritization methodology to improve bicycling, walking, rolling, and using micromobility in Lexington. It also summarizes Lexington's safety and promotion programs for bicyclists and pedestrians and provides an implementation strategy to encourage a phased approach to improving active transportation in the town.

1.1 Bicycle and Pedestrian Plan Overview

The Lexington Town-wide Bicycle and Pedestrian Plan (TBPP) identifies current and future desired conditions for bicycling, walking, and rolling in Lexington. It serves as a guide for the Select Board, Town staff, the Transportation Safety Group (TSG), various committees, residents, and local advocates to work together to accommodate pedestrians, bicyclists, and other active transportation users in a coordinated and holistic manner. The Plan is an action-oriented document designed to help bridge the gap between current conditions and what residents and visitors envision for safe, comfortable, and connected bicycle and pedestrian facilities and the policies and programs that support them. This is the Town's first town-wide bicycle and pedestrian plan and provides an opportunity to enhance walking and bicycling safety and connectivity throughout Lexington.

Striped bike lanes, crosswalk and flashing beacon on Pleasant Street

In aggregate, the TBPP includes nearly 300 distinct recommendations.

Table 1 Summary of Recommendations by Category

Facility Category		Number	Total Miles
Trails	New Trails	15	2.6
	Improved Trails	12	3.5
	Shared-use Paths (in Road ROW)	8	3.7
Bicycle Facilities	Separated Bicycle Lanes	9	4.5
	Standard Bicycle Lanes	38	18.6
	Shared Lanes w/ Traffic Calming	30	11.5
Intersection Improvements		34	NA
Sidewalks	New Sidewalks	79	15.7
	Improved Sidewalks	13	4.9
Crosswalks	New Crosswalks	29	NA
	Improved Crosswalks	31	NA
Total		298	65.0

1.2 Summary of Public Engagement

Throughout the year-long process, the planning team provided a series of opportunities to understand the needs of bicyclists and pedestrians and the preferred outcomes for the Lexington TBPP. The outreach and engagement included interviewing key stakeholders, bi-monthly meetings with the pre-established Transportation Safety Group "+" (i.e., the TSG plus additional members), three public meetings, and an on-line survey which included a community-input mapping tool.

Stakeholder Outreach

Primarily in the early phases of the planning effort, Town staff and the consultant team met with a variety of stakeholders with a keen interest in pedestrian/bike safety, safe routes to school, trails, and accessibility issues. Input from the following groups and committees helped with the assessment of existing conditions and informed recommendations for bicycle and pedestrian programs and infrastructure projects:

- Bicycle Advisory Committee
- Transportation Advisory Committee
- Safe Routes to School advocates

- Greenways Corridor Committee
- Representatives of the Conservation Commission and Greenways Corridor Committee
- High school students from LHS and elsewhere
- Council on Aging
- Commission on Disability
- Sustainable Lexington

Transportation Safety Group +

The Transportation Safety Group (TSG) is a Town Manager appointed group that focuses on concerns and ideas related to traffic safety, public transit, and bicycle/pedestrian accessibility and safety. For the TBPP, additional stakeholders were invited to attend bi-monthly meetings of the renamed TSG+ to help guide the consultant team's analysis and planning work. The group's input influenced the format of the public meetings, the plan's goals, weighting of the evaluation criteria, and the nature of some of the bicycle and pedestrian facility recommendations.

Public Meetings

Throughout 2023, the Town hosted three public meetings to inform the community of the planning work, to receive input on concerns and ideas, and to present the initial draft recommendations and prioritization. Meetings included:

- **April 4 at the Lexington Community Center.** After an introductory presentation, the 40-45 attendees broke into smaller groups and focused on bicycle and pedestrian issues within four quadrants of the town. Dozens of comments and ideas were incorporated into the draft set of facility recommendations and the TBPP's draft goals.
- **June 8 at Cary Hall's main auditorium.** Following a slide presentation related to the initial network recommendations, the roughly 25 meeting attendees gathered at three "theme" tables. The stations allowed for feedback and detailed comments related to the draft bicycle, pedestrian, and safe routes to school-related recommendations, respectively. Attendees also provided input on

VHB project manager Phil Goff presenting at the April 4 meeting at the Lexington Community Center

June 8 meeting attendees at Cary Hall gather around the maps to discuss draft network recommendations

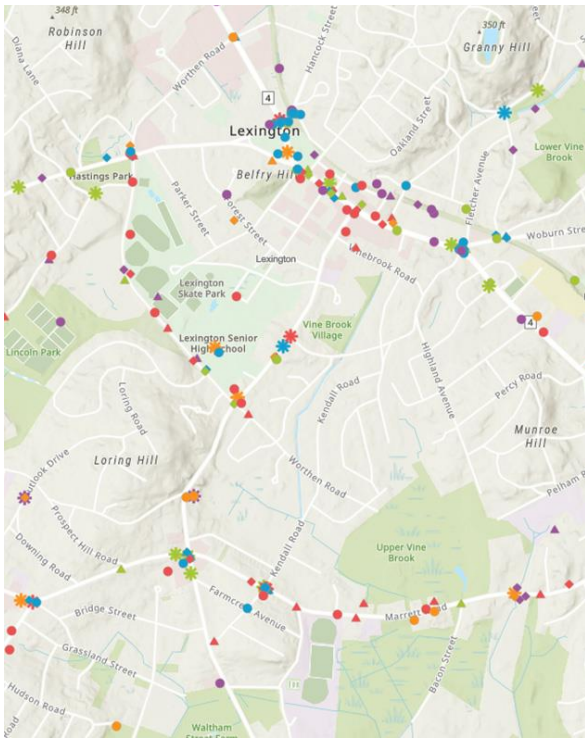
the highest priority corridors and answered a series of policy-based questions related to the trade-offs between bike and pedestrian facilities and on-street parking along constrained road corridors.

- **September 14 at the Community Center Lunch with Council on Aging.** Town staff solicited opinions on issues of concern, how to prioritize improvements and how we should consider trade-offs.
- **November 1 at Estabrook Hall within Cary Hall.** The presentation included the final draft bicycle and pedestrian facility recommendations, the methodology used within the prioritization process, and the "top 10" highest scoring projects within each category. The 25 attendees then asked questions about the overall plan, clarification on the highest-scoring recommendations, and expectations for implementation over time.

Online Survey and Input Map Results

From April to late June, an online survey was made available to community members. The 17-question survey garnered 374 responses, 91% of which came from Lexington residents. Questions related to how often they walk and bike locally, the barriers they experience as pedestrians and bicyclists (and for children getting to school), potential counter measures to improve access and safety, current use of e-bikes and e-scooters, and how they would prioritize funding for bicycle and pedestrian improvements in the town. For the latter question, the survey asked respondents how they would like to spend $1.00 (100 pennies) on bicycle and pedestrian infrastructure and programs in Lexington. Results included:

- Improve connections to public transit: $0.09
- Education and safety training programs: $0.04
- More trails and multi-use paths: $0.20
- Striped bike lanes/protected bike lanes: $0.20
- Improving or adding new sidewalks: $0.18
- Winter maintenance of paths, trails and sidewalks: $0.11
- Safer intersections and road crossings: $0.16
- Programs to promote alternatives to driving: $0.02



Portion of the online survey's interactive map highlighting input in Lexington Center, around LHS and along Marrett Road/Rt. 2A

Two of the survey questions gave participants the opportunity to provide responses onto an interactive, online input map. Comments for desired facilities were able to be coded by project type: new bike lanes, intersection safety improvements, new/improved crosswalk, new/improved path or trail, and new/improved sidewalk. Many of the hundreds of online map comments—along with those made in person including the public meetings and the

Community Center lunch meeting with seniors—received provided the foundation for the first iteration of bicycle and pedestrian facility recommendations made by the planning team.

Full results from the survey are available in Appendix A.

1.3 Existing Lexington Plans and Reports

The Town has already established momentum in improving bicycling, walking, and rolling with planning work such as the Complete Streets Prioritization Plan in 2016, the Climate Change Resolution in 2017, the Sustainability Action Plan in 2018, Open Space and Recreation Plan in 2023, the Comprehensive Plan in 2022, and the Vision Zero Action Plan in 2022. The Town-wide Bicycle and Pedestrian Plan builds from these efforts to ensure a level of continuity.

MBTA Communities Act (2023)

In early 2023, Lexington Town Meeting approved a rezoning effort as part of the Commonwealth's MBTA Communities Act legislation. Approval amended the Town's Zoning Bylaw and Zoning map to allow multi-family housing "by right" in newly created Village and Multi-family Overlay Districts. Town Meeting's approval also included specific parameters for future projects related to permit process, permitted uses, maximum heights, minimum parking requirements, minimum setbacks, and inclusionary housing requirements. By approving the changes to the Zoning Bylaw, the Town retains eligibility for MassWorks Infrastructure and Capital Project Fund State Grant Programs Areas. The new overlay districts include areas in East Lexington along Mass Ave, various parts of Bedford Street, Concord Ave at Waltham Street, parts of Marrett Road, and nodes along Hartwell Avenue (at Bedford Street, Maguire Road, and at Wood Street). Because new multi-family housing will bring higher population density to some parts of Lexington, demand for bicycling and walking facilities in these areas is likely to increase.

Vision Zero Action Plan (2022)

The August 2022 Vision Zero Action Plan explains the goals of Vision Zero and provides context as to why those goals are important for the Town of Lexington. The Plan contains town-wide graphics showing comprehensive reviews of the numbers of crashes, their severity, and which crashes involved non-motorists between 2015 and 2019. The plan was developed by the firm Environmental Partners.

The Vision Zero Action Plan collected data from Town residents who were invited to use an interactive mapping tool to pinpoint locations where they have experienced a near-miss, were involved in a crash, or witnessed dangerous behavior. Another map collected information on locations where the public believed there was missing pedestrian or bike accommodations such as sidewalks, crosswalks, or bike lanes.

The Vision Zero Action Plan with a full description of all proposed objectives can be found at https://www.lexingtonma.gov/DocumentCenter/View/7060/2022-08-30_Lexington-Vision-Zero-Action-Plan

No specific locations for pedestrian or bike infrastructure improvements were explicitly stated but the plan describes high-level objectives that ranged from making intersections safer to creating an inventory of existing mid-block crossings, to implementation of a low-stress bicycle network.

The Vision Zero Team intends to plan infrastructure improvements throughout the Town in the next few years and expectation are that the Town will coordinate recommendations within the Town-wide Bicycle and Pedestrian Plan.

LexingtonNEXT Comprehensive Plan (2022)

The LexingtonNEXT Comprehensive Plan was adopted by the Planning Board on September 28th, 2022, replacing previous Comp Plans from 2002 and 2003. The plan states the following goals (with Objectives 4.3 and 7 call for an inclusive, multi-modal community coinciding with the goals of the Town-wide Bicycle and Pedestrian Plan):

1. To promote the diversity, equity, and inclusion of people visiting, living, and working in Lexington
2. To promote a wide range of housing options that respond to the needs of households, regardless of the income and life stage
3. To promote a vital economy, including small and large businesses that contribute to the tax base and provide goods and services to meet the needs of residents, employees, and visitors
4. To enhance quality of life, health, and safety by implementing practices and policies that enhance sustainability and resiliency in our community
    - 4.3 Reduce transportation emissions by improving sustainable transportation options and reducing single occupancy vehicle trips
        - 4.3.1 Increase public transit options and passenger miles traveled
        - 4.3.2 Advocate for Transportation Improvement Districts at the state level
        - 4.3.3 Enhance safety of walking and bicycling and increase micro mobility options
5. To protect open spaces and natural resources and to enhance their connections
6. To protect, preserve, and promote awareness and appreciation of Lexington's historic and cultural resources from throughout its history
7. To make traveling into, out of, and within Lexington safe, pleasant, and efficient with sustainable and equitable mobility options for all ages and abilities
    - 7.1 Improve traffic management policies to increase safety and enhance quality of life
    - 7.2 Expand options for walking, biking, and micro-mobility
        - 7.2.1 Develop and implement a town-wide bicycle and pedestrian plan
    - 7.3 Improve parking strategies to achieve transportation and economic development goals
    - 7.4 Expand transit options
    - 7.5 Adopt land use polices that advance the town's transportation goals
    - 7.6 Increase public awareness and community pride in use of alternative modes of travel
8. To improve and expand facilities for recreation and community gathering to support holistic wellbeing, a sense of belonging, enhance community connections, fun, and to build community through social engagement
9. To provide well-maintained, updated, inclusive and sustainable public facilities to serve and meet community needs.
10. To support and advance Goals 1-9 of LexingtonNEXT through appropriate land use planning

Open Space and Recreation Plan (2023)

The Open Space and Recreation Plan's (OSRP) was prepared for the Town of Lexington by Activas Architecture and Engineering in 2023. The OSRP's primary objective is to expand, maintain and protect open space and other recreation assets in the Town. The OSRP provides a comprehensive review of the natural resources of the town, from its waterways and geology to its vegetation and wildlife. The OSRP also conducted a community survey which asked residents to determine their priorities for the open space in Lexington. Hiking trails, restrooms and paved multi-use paths were determined to be high or medium priority goals for the OSRP.

The Town-wide Bicycle and Pedestrian Plan will consider the environmental effects and impacts of additional or wider paths through open spaces within Lexington. The Plan team will consider coordination with the OSRP team to better manage the goals of both projects.

Complete Streets Policy and Complete Streets Project Prioritization Plan (2016)

The Complete Streets Policy was approved in March 2016 with the goal to implement Complete Streets elements into the planning and design of all capital projects so that they are safe for all ages and abilities in Lexington.

This policy helps to integrate complete streets principles in all transportation projects. The Town will use existing infrastructure planning tools including a pavement management plan (covering all Town streets), a pedestrian facility condition index, a five-year capital plan, and various GIS transit related maps.

Supplementing the Complete Streets Policy, the Complete Streets Project Prioritization Plan (CSPPP) was submitted to MassDOT for future Tier 3 Complete Streets Program funding. The CSPPP included 50 projects focused on safety, ADA accessibility, pedestrian mobility, bicycle mobility, and vehicular operations.

South Lexington Transportation Study (2015)

The South Lexington Transportation study was completed in January 2015 by Fay, Spofford & Thorndike (FST) with RKG Associates. The purpose of this study was to identify the potential traffic impacts of proposed redevelopment project in South Lexington, determine if any additional transportation improvements should be implemented (beyond what has already been proposed), identify priorities for implementation, and provide preliminary cost estimates for the proposed improvements.

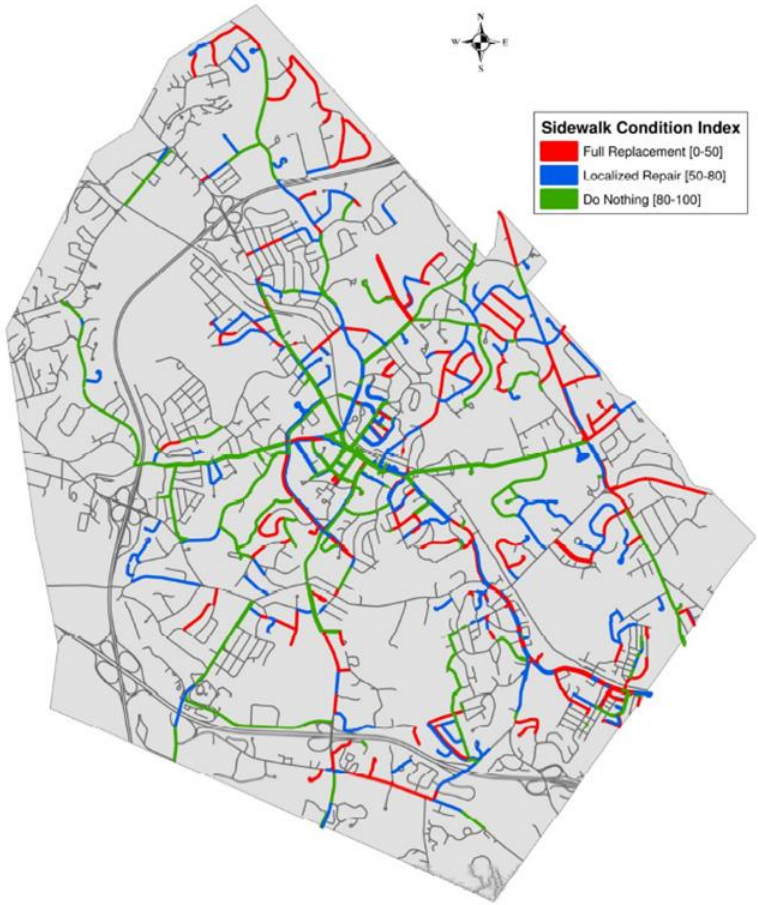
The Study provided recommendations for additional pedestrian and bike improvements, many of which lie on state roads (and therefore would require close coordination with MassDOT). Recommendations included:

- Marrett Road (Route 2A) at Lincoln and School Street: new signalization, additional greenspace replacing the north leg of Lincoln Street, driveway adjustments, and a re-orientation of School Street to reduce pedestrian/bike/vehicle conflicts.
- Marrett Road (Route 2A) at Carey Street and Middle Street: re-alignment of the two closely spaced intersections into a single intersection, more usable greenspace, pedestrian-actuated flashing beacons (*installed in 2021*), and improved maintenance of overgrown vegetation.
- Hayden Avenue at Route 2 Interchange: replace slip lanes for westbound Rt. 2 off ramp and EB Hayden Avenue access to Waltham Street with three new signalized intersections.
- Concord Avenue at Walnut Street and Pleasant Street: new ADA landings and sidewalk improvements at Pleasant Street (*installed in 2019*), and a new crosswalk, sidewalk landings, and potential RRFB at west leg of Concord/Walnut intersection.
- Lincoln Street at Middle Street: square the intersection with stop control for west bound traffic on Middle Street. *(installed in 2022)*
- Shade Street at Spring Street: consider a new crosswalk on the north leg of the intersection.

Pedestrian Accessibility Study (2014)

The Pedestrian Accessibility study was prepared by FST and submitted to the Town of Lexington in December 2014. The goal of this study was to create a comprehensive GIS database of all sidewalks and curb ramps, and their current quality. Additional data such as trip hazards and pinch points were also documented. Based on the sidewalk condition index, it was determined that the backlog of repairing and maintaining Lexington's sidewalk network was $7,037,124 at the time of the study[3]. As a result of the study each year $800,000 is appropriated on sidewalk maintenance.

Figure 3 Sidewalk Condition Index Map



[3] Since the completion of the 2014 study, the Town has since established a roughly $800,000 annual budget for regular sidewalk maintenance.

School Committee Traffic Safety and Mitigation Policy (2014)

The School Committee is responsible for traffic safety and mitigation on school property. The purpose of the Policy is to improve safety by affecting driver behavior and the quality of life for residents, pedestrians, bicyclists, and motorists. In addition, it is to ensure that school traffic plans do not hinder quick response time for emergency service vehicles including fire trucks, police cars, ambulances, and large vehicles such as school buses and trucks used for providing essential municipal, school, and resident services. Any changes to posted traffic plans for each school building must be reviewed by the Transportation Safety Group before being approved by the School Committee and implemented by the building Principal.

Traffic Calming Policy (2009)

The Town of Lexington Traffic Calming Policy was created in 2009 to assist the Town in defining what constitutes Traffic Calming and how residents can request measures be taken on their street. The Traffic Safety Advisory Committee (TSAC) is responsible for reviewing and approving traffic calming measures. If traffic calming is determined to be needed, the TSAC develops conceptual plans and after a public meeting the preferred traffic calming measures will be implemented and monitored. The TSAC was replaced with the Transportation Safety Group in 2014.

West Lexington Greenway Master Plan (2009)

The West Lexington Greenway Master Plan was prepared by VHB and submitted to the Town of Lexington in May 2009. The Master Plan was created in conjunction with the West Lexington Greenway Task Force to "create a detailed picture of the entire area in order to conduct an informed planning process for trail alignment and improvement". A network of trails and paths through open space and conservation lands connect West Lexington and beyond. Environmental and political constraints make further development of these trails and paths extremely difficult. The established network will help to inform potential improvement recommendations in the Town-wide Bicycle and Pedestrian Plan. More information on the specific trails can be found at: https://www.lexingtonma.gov/231/Trails.

2

Existing Conditions

The planning team reviewed existing pedestrian and bicycle programs in Lexington, as well as existing conditions for pedestrians and bicyclists throughout the Town.

2.1 Existing Pedestrian and Bicycle Programs

Pedestrian and Bicycle Safety, Education, and Encouragement Programs

The Town of Lexington provides safety, education, and encouragement programs for bicycling and walking[4]. These range from year-round programming such as Safe Routes to School walking buses and bike trains, and seasonal events typically held in May such as Bike Rodeos and Bike Walk 'N Bus Week.

Other seasonal or recurring promotional activities include tabling at events with informational and educational resources, conducting bike lights giveaways, coordinating group bike rides during the year, and helmet distributions.

Lexbikewalkbus.org Web Page

The Town currently hosts a web page that promotes walking, bicycling, and using transit as transportation options within Lexington. Called www.lexbikewalkbus.org, the site is managed by Lexington Transportation Services (see Acknowledgement's page for contact). The site provides a convenient "one stop" location for resources related to walking, bicycling, and public transit with an emphasis on the promotion of Safe Routes to School. Other programs—typically held between April and October—promoted on the site include

4 More information can be found at: https://www.lexingtonma.gov/1386/Biking-Resources

Smart Cycling Adults, Smart Cycling Teens, Smart Cycling Women, Bike Smart Youth, Bike Rodeos, Flat Tire Clinics, Bike Maintenance Clinics, and family-friendly bike rides.

Safe Routes to School

The Town of Lexington coordinates a Safe Routes to School (SRTS) Program[5], as part of a larger state, national, and international initiative. The goal of the program is to encourage students to walk or bike to school on selected safe routes by providing route maps and coordinating walking and biking groups.

SRTS route maps[6] for walking and biking to school are published by the Town and MassDOT and provide detail on crosswalk locations, seasonal routes, and the Minuteman Bikeway where applicable. They include the following schools:

- Elementary Schools: Harrington Elementary, Maria Hastings Elementary, Fiske Elementary, Estabrook Elementary, Bridge Elementary, and Bowman Elementary
- Middle Schools: Jonas Clarke and William Diamond Middle Schools
- Lexington High School was recently included under the MassDOT's decision to allow high schools to participate in the program. The Town's Transportation Services department recently created a High School Ambassador program to help promote active transportation options at LHS.

Walking buses and bike trains are parent-chaperoned groups for walking or biking to school to encourage physical activity, social connections, and more environmentally friendly trips to school. The SRTS groups coordinate student drop-off and pickup points along the specified routes. Lexington provides an online interest form[7] for new participants to connect with others to join or lead a group, or to request more information. MassDOT supports SRTS activities such as walking school buses and bike train programs by providing informational resources[8] and walking school bus kits which include supplies[9][10].

Hastings School bike trains have become a popular program to promote bicycling for young children.

5 Lexington SRTS website: https://www.lexingtonma.gov/707/Safe-Routes-to-School

6 Lexington SRTS maps can be found at this link: https://drive.google.com/drive/folders/1qQjUsjcDUXlH13e4SJW-RRekYggyeEsr

7 Walking School Bus / Bike Train Interest (google.com)

8 download (mass.gov)

9 Safe Routes To School - Encouragement | Mass.gov

10 Safe Routes to school Request (state.ma.us)

Bike Rodeos

Lexington hosts Bike Rodeo events[11] each spring for grades K through 8, to teach students bicycling skills and bike safety through an obstacle course format. Bike Rodeos feature group instruction on the rules of the road, a test as part of the 30-minute obstacle course, and also safety services such as checking the fit of helmets[12] and bikes. The events also offer informational stations to provide education and encouragement of bicycling. Helmets are typically provided by donation from Boston Children's Hospital Injury Prevention Program. Volunteers from the Lexington Bicycle Advisory Committee frequently help with helmet fitting for the young recipients. Bicycle lights and reflective arm bands/ankle straps have also been distributed.

Bike Walk N' Bus Week/Month

Each May, Lexington hosts an annual week of events each May, "Bike Walk N' Bus Week"[13] to encourage walking, bicycling, and riding transit. The events included historic walks, guided bike rides, bike commuter breakfasts at the Depot, free Lexpress bus rides to promote the Town's various alternative transportation resources. The Town staff organize the event week, along with the Bicycle Advisory Committee, Greenways Corridor Committee, and Safe Routes to School Committee.

Summary of Sidewalk Request Program and Prioritization Tool

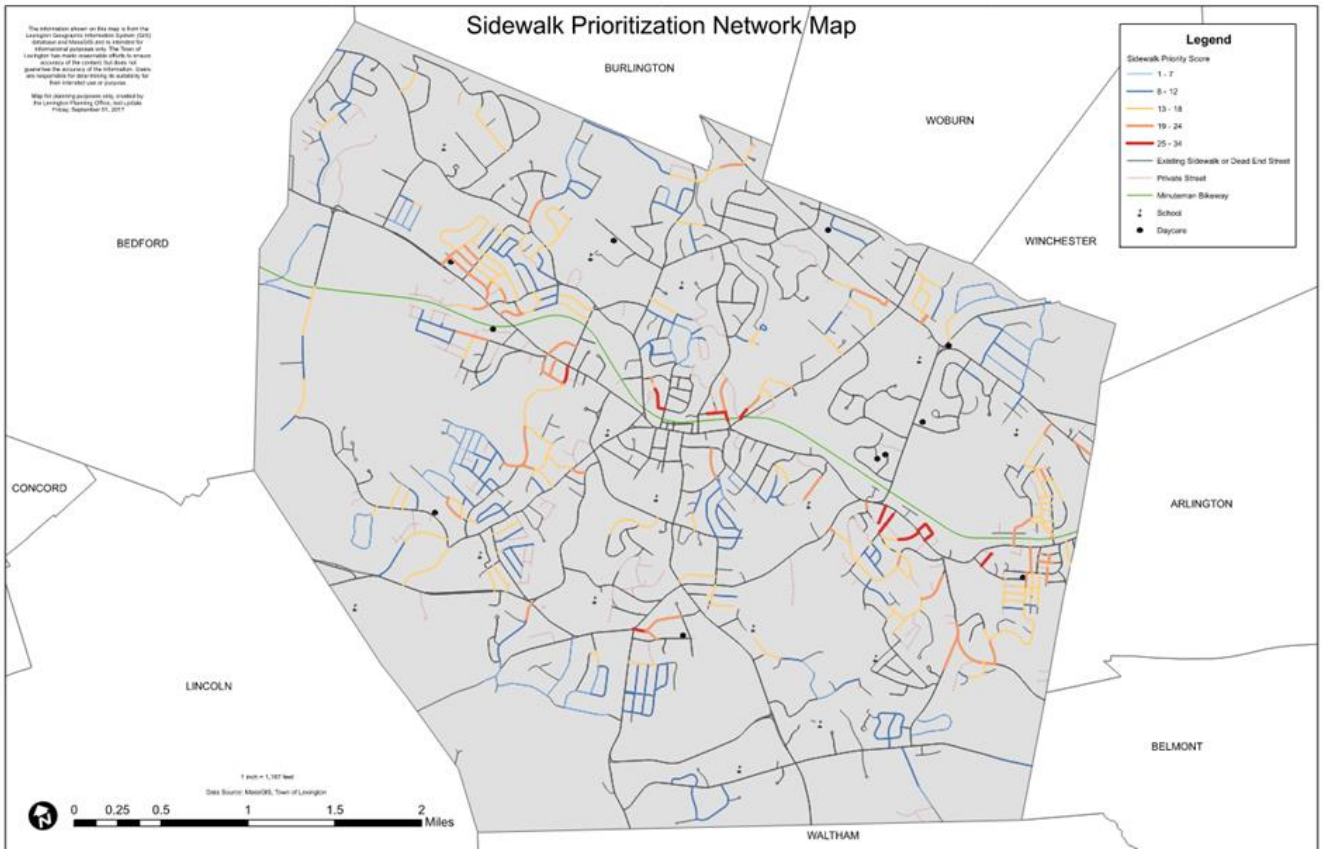
The Town created the Sidewalk Request Process in 2017 to facilitate the review/design/installation of sidewalks in locations where residents request them. First, residents must submit a "New Sidewalk Request Form" to the Transportation Safety Group (TSG) which outlines the specific sidewalk location need, as well as the signatures of neighbors. After a staff review and additional data collection from the Town (including reviewing the Pedestrian Accessibility Study – see section 1.3), the Town will also review the Sidewalk Prioritization Tool which accounts for land use mix, proximity to local destinations, and the density of nearby development to create a Sidewalk Priority Score. Comments from the public are then considered along with a full engineering analysis to provide more information on the feasibility of the project. This process is currently on hold pending the results of this plan.

11 Recreation & Community Programs | Human Services Department: Bike Rodeo (K-8) (myrec.com)

12 How to Fit a Bicycle Helmet (helmets.org)

13 https://www.tourlexington.us/home/events/6463

Figure 4 Sidewalk Request Program Sidewalk Prioritization Map



Lexington has a structured program for reviewing and prioritizing requests from residents to build new sidewalks throughout the Town[14]. The Town's 2017 Sidewalk Request Program and Prioritization Tool outlines the steps for residents to officially request a sidewalk, the Town's review process, and the method for approving, funding, and prioritizing construction of feasible sidewalk locations, given the Town's limited resources. The process can typically take several years to complete, depending on the scale and the scope of the request.

The prioritization tool, released in 2017, seeks to prioritize requests with quantitative metrics to address areas with the highest existing needs and potential for pedestrian traffic. The tool takes into account various pedestrian trip generators and provides a prioritization score, screening out locations such as state-owned roadways, streets with existing sidewalks, cul-de-sacs, and dead ends.

The process for a sidewalk request includes the following phases and steps:

› Phase 1 - Initial Review

- Request Form Submitted by Petitioner[15]
- Transportation Safety Group (TSG) Staff Review
- Initial Meeting with Petitioner

14 Sidewalk Requests | Lexington, MA (lexingtonma.gov)

15 New Sidewalk Request Form (lexingtonma.gov)

- Phase 2 - Evaluation
  - TSG Staff Evaluation & Data Collection
  - Collection of Signatures by Petitioner
  - Public Meeting with Direct Abutters and Petitioner
  - Presentation to the Board of Selectmen
  - Town Meeting Request for survey and other evaluation funding, if needed
- Phase 3 - Further Engineering Analysis
  - Procure Consultant
  - TSG Reviews Results and Makes Recommendation
  - Public Meeting
  - Board of Selectmen Meeting
  - Town Meeting for design and construction funding
- Phase 4 - Design & Installation
  - Because the sidewalk program is resident initiated and then needs a project champion to shepherd the project through the lengthy process, sidewalks were being built in locations that may not be the most effective equitable use of Town resources. The program did provide a clear path to requesting sidewalks but may miss areas that would have a bigger impact on the entire pedestrian and multimodal network.

2.2 Existing Active Transportation Network

Natural surface shared-use path through Willard Woods

The existing bicycling and pedestrian network in Lexington includes sidewalks, curb ramps, crosswalks, walking trails, paved shared use paths, bicycle lanes, and streets designated for bicycle and vehicle mixing with shared-lane markings. The core of the Town's active transportation[16] network is the spine formed by the Minuteman Bikeway with the secondary paths and trails that lace through the Town's open spaces. While the Minuteman is a mostly seamless experience for bicyclists and pedestrians, some road crossings still require enhancements to further improve the level of comfort for pedestrians and the many novice bike riders and families. The secondary paths further support bicycle and pedestrian connectivity in Lexington and offer non-motorized opportunities to travel through different neighborhoods. Many of these paths:

- Require widening to accommodate both bicyclists and pedestrians
- Lack seamless connections to other on-street bikeways and sidewalks
- Require upgrades to road crossings to improve safety and comfort

16 Active transportation refers to walking, bicycling (both standard and e-bikes), using micromobility devices such as an e-scooter, and operating a wheelchair or other mobility device.

Existing Bicycle Facilities

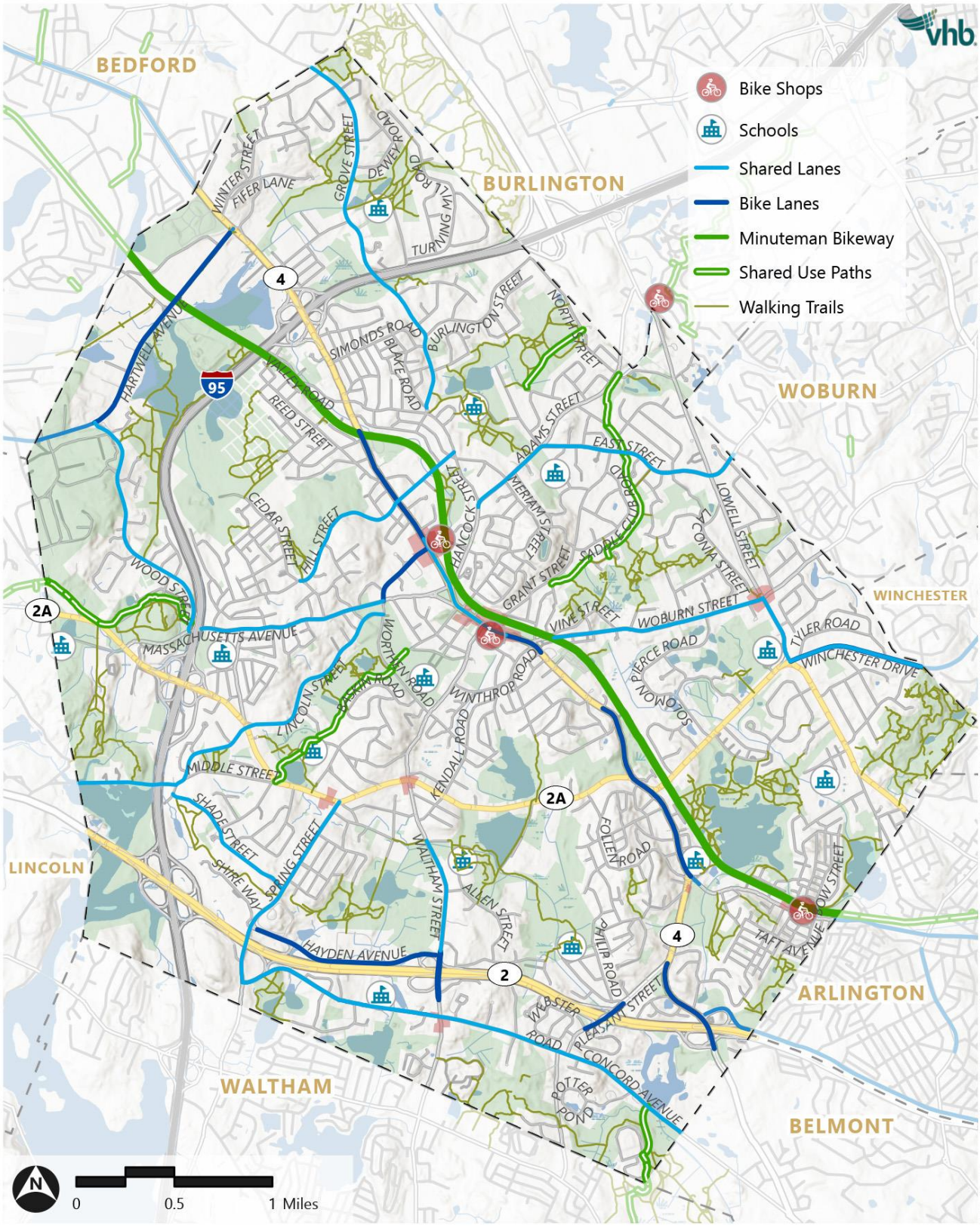
Bicycle facilities in Lexington include shared use paths, conventional bike lanes, and buffered bike lanes. Some streets where people bicycling and drivers must share the road are also designated with shared-lane markings (SLM), aka "sharrows", although this is not in itself a bike facility. Figure 5 shows locations of existing bike facilities including shared lanes, which are streets striped with sharrows. Although many major roads have some type of facility or treatment, facilities are disconnected, lack a clear path of travel through intersections, and lack important connections to schools, recreation areas, and business areas.

Some segments of Mass Ave feature 5-foot-wide, striped bike lanes

League of American Bicyclists Bike-Friendly Community Program

Given the current network of on-street bike facilities and off-road paths, along with the Town's current policies and programs towards bicycling, the Town was recognized in 2014, 2018, and 2022 as a bronze-level Bicycle Friendly Community (BFC) by the League of American Bicyclists (LAB). The LAB recognizes cities and towns that have a strong bicycling culture. In this category, Lexington's formal advisory committees, trail enthusiasts, and safe routes to school advocates—especially those who run the bike trains—help the Town to achieve its BFC recognition. Points are also given for previous and ongoing bicycle planning efforts. The completion of the TBPP at the end of 2023 can be used to bolster the Town's next application to achieve the next highest designation: Silver.

Figure 5 Existing Bicycle Facilities



Source: MassGIS, MassDOT, MAPC, Town of Lexington

Existing Paths and Pedestrian Facilities

As a historic town with compact residential neighborhoods, an established path network, and a central business district with a strong sense of place, Lexington in general is a very walkable community. Challenges persist, however, as the popular historic sites and auto-oriented culture induce significant motor vehicle traffic. Promoting slower traffic speeds, eliminating sidewalk gaps, and improving pedestrian facilities at intersections are all critical to enhancing both safety and quality of life for residents. A map of existing trails, walking paths, and pedestrian facilities is shown in Figure 6. The pedestrian network includes on-street sidewalks and curb ramps for ADA access, as well as crosswalks to assist pedestrians to cross major roads or reach significant destinations.

Some crosswalks in Lexington include pedestrian actuated flashing beacons, such as the Marrett Road crossing at Middle Street to the Vine Brook Path

Figure 6 Existing Paths and Pedestrian Facilities

Source: MassGIS, MassDOT, MAPC, Town of Lexington

Existing Bicycle and Pedestrian Routes to School

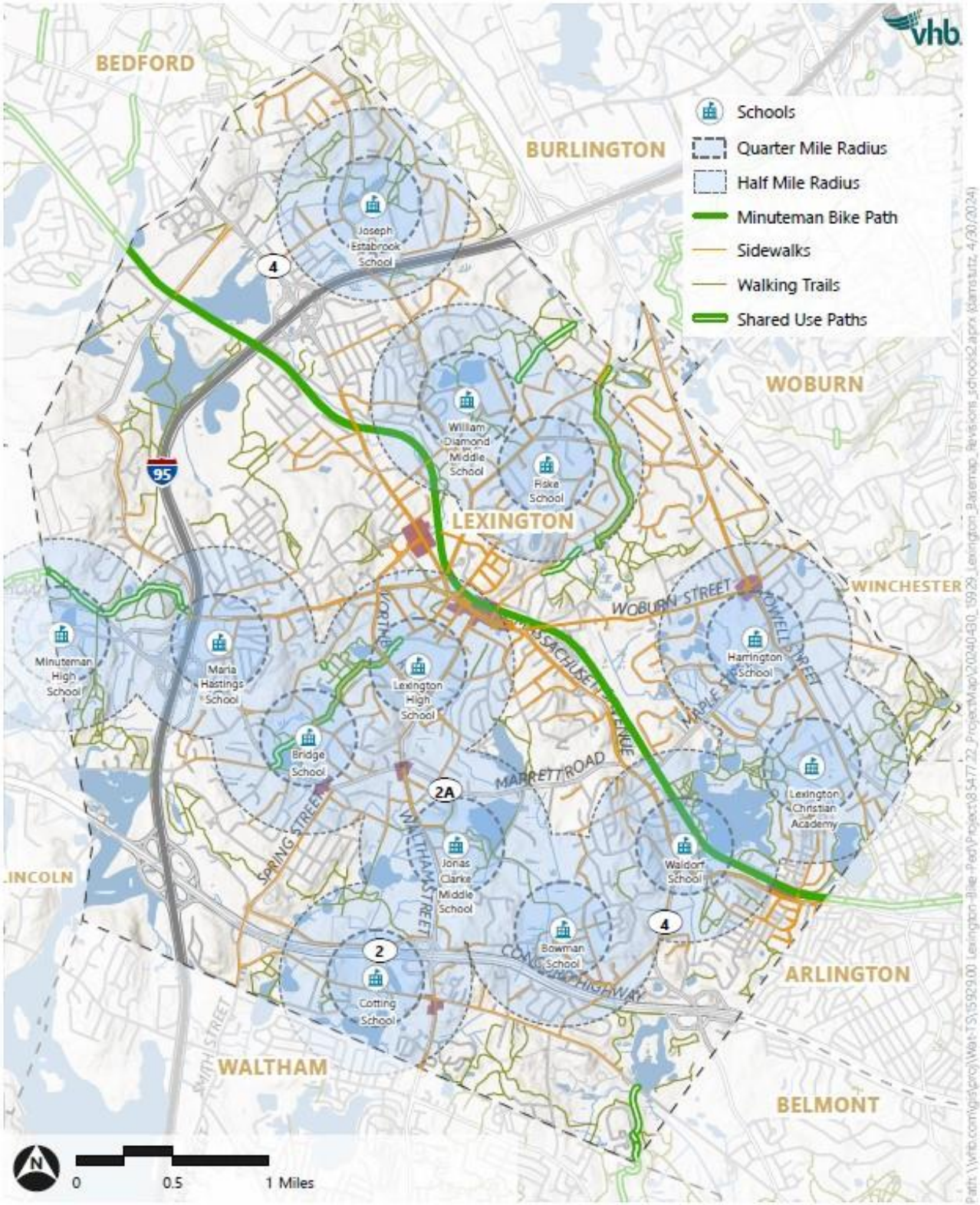
Arguably, the highest mobility priority for any community is to provide safe and accessible routes for children. With a relatively complete network of sidewalks in many neighborhoods, many hundreds of Lexington students walk or roll to school throughout the year. Even with discontinuous bike facilities near many schools, hundreds of students' bike to school as well. Conditions have gradually improved with Safe Routes to School planning efforts and the work of Town staff, school officials, advocates, the Transportation and Bicycle Advisory Committees, and the Greenways Corridor Committee.

On pleasant weather days in spring and fall, dozens of bicycles are typically parked at the Clarke Middle School

Secure bike parking is lacking at many schools in Lexington. More bicycle parking is needed particularly at LHS and the two middle schools. In some places the racks are well designed while others don't meet industry standards to allow two points of contact so bikes don't tip over. Racks that don't meet industry standards should be replaced. Covered bike parking—ideal to promote year-round and all-weather riding to school—is lacking at most schools as well.

Figure 7 shows existing pedestrian infrastructure as it relates to access to schools. This includes public and private schools, which are shown with quarter-mile and half-mile buffers around them to identify areas where walking to school is most feasible. The Minuteman Bikeway and other shared-use paths and walking trails are also displayed, as these are other ways for students to access schools beyond the street network. Students frequently use trails and off-road paths to access schools when streets lack sidewalks or when a shortcut is the most direct route from home to school. However, many of these trails are unpaved and narrow, which can get muddy in wet seasons and icy or snow-covered in the winter, forcing students to use alternate paths or be driven to school. In addition, lack of sidewalks and comfortable crossings also discourage parents from letting their children walk to school.

Figure 7 Existing Pedestrian Routes to School



Source: MassGIS, MassDOT, MAPC, Town of Lexington

2.3 Planned or Funded Transportation Projects with Bicycle and/or Pedestrian Elements

As part of the assessment of existing conditions, the consultant team reviewed planned or funded projects in Lexington that include an active transportation component.

Town of Lexington and MassDOT Projects

Table 2 Planned Projects

Project Name	Project Type	Current Stage	Milestone	Notes
Battle Green Streetscape (Town of Lexington)	Streetscape, Roundabout	Construction	April 2023 planned construction start; 2024 completion target	Sidewalk improvements, resurfacing, shortened crossings
Lexington Bridge Replacement, L-10-010, Route 2A/Marrett Road over I-95 (MassDOT Project 603722)	Bridge Replacement	Construction	Construction start 2023, completion 2025	The project will include pedestrian and bicycle accommodations that feature a shared use path along the north side of the bridge with tighter turning radii to calm traffic going to and coming from the ramps.
Resurfacing and related work on Route 2A (also in Concord-Lincoln)	Resurfacing DOT Owned Non-Interstate	Design	Project delayed until 2026	MassDOT #608495
Bedford/Hartwell Complete Streets Reconstruction Project	Complete Street Reconstruction	25% Design	MPO/LRTP 2029-2033	The project will include pedestrian and bicycle accommodations that feature a shared use path
Cedar Street Sidewalk	New Sidewalk Construction	Final Design	Expected construction 2024	
Pleasant Street/Watertown Street Intersection Redesign	Roundabout	Final Design	Expected construction 2024	The project creates a safer intersection geometry and pedestrian accommodations.

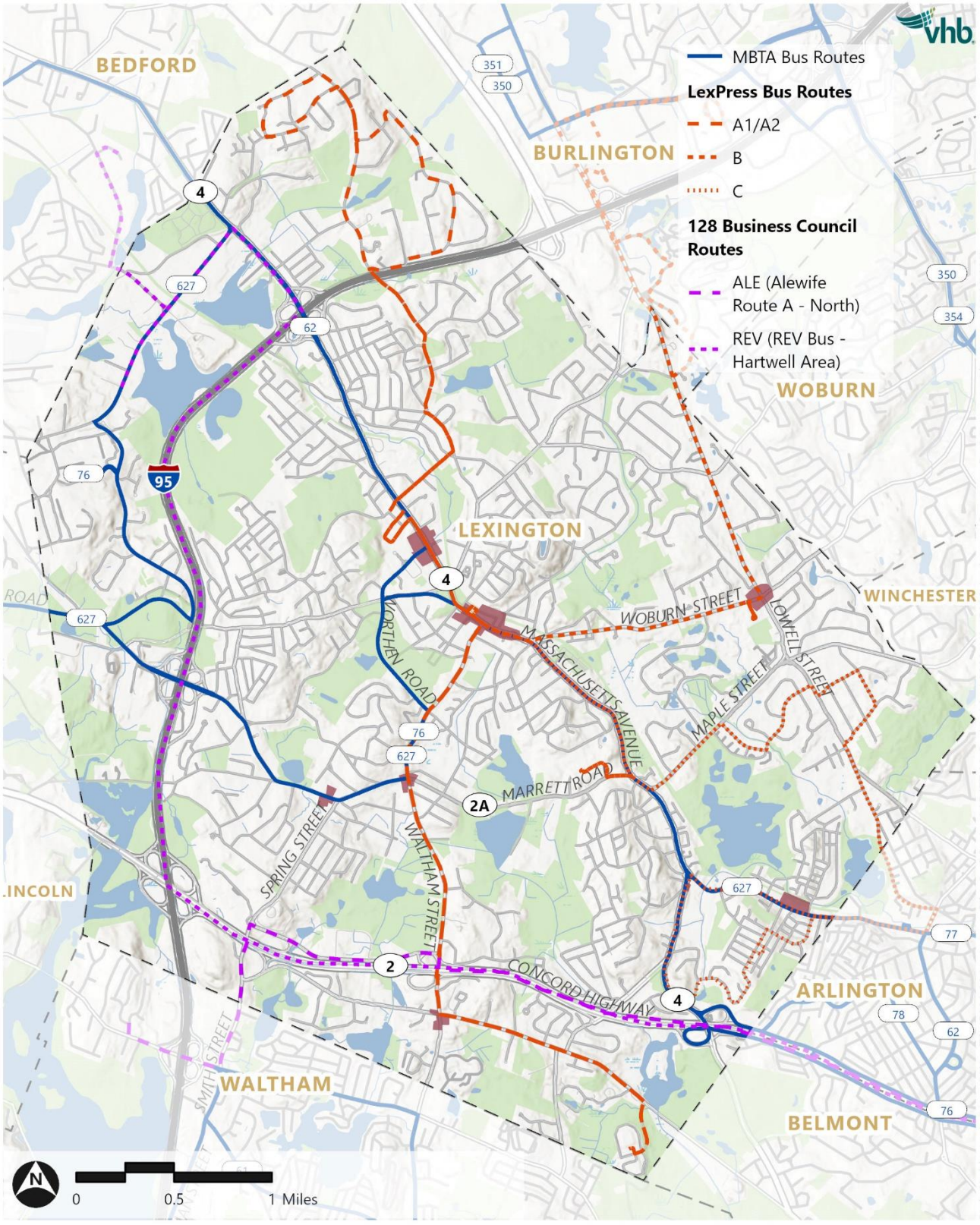
Source: Town of Lexington Pedestrian and Bike Projects | Lexington, MA (lexingtonma.gov) and MassDOT

2.4 Existing Transit Network

The existing transit network is shown in Figure 8. Bus service provided by the Massachusetts Bay Transportation Authority (MBTA) includes Bus Routes 62 (Bedford VA Hospital – Alewife Station), 76 (Lincoln Lab – Alewife Station), and the combined 62/76 (Bedford VA Hospital – Alewife Station via Hanscom Airport). Local bus service is also provided by Lexpress, which is run by the Town and operates primarily within the boundaries of Lexington; however, it also makes connections to Arlington Heights in Arlington and the Burlington Mall and Lahey Hospital in Burlington. There are routes A1/A2, B, and C, which originate at Depot Square in Lexington Center. Finally, shuttle service to Alewife Station is provided by the 128 Business Council with pickups in Lexington. The Council's REV Bus (Hartwell Area) picks up at Lexington Center while the ALE (Alewife Route A – North) Bus picks up commuters near Spring Street and Route 2 (Takeda Pharmaceuticals) and 1050 Waltham Street (Revolution Labs) in Lexington.

Although limited, the transit network in Lexington provides critical service for local residents traveling throughout town or commuting in the region. Transit users often start and end their journeys on foot, so safe and comfortable pedestrian infrastructure to transit is a key strategy to encouraging its use. In addition, many transit buses have bike racks to allow cyclists to place their bike on the bus and take it to their destination to extend the range of their journey.

Figure 8 Existing Transit Network



Source: MassGIS, MassDOT, MAPC, Town of Lexington

2.5 Destinations, Amenities, and Activity Centers

There are many key destinations in Lexington that residents and visitors alike travel to visit. Some of these destinations are easier to reach by walking and biking than others. Shown in Figure 9, key destinations include Lexington Center, the Library, the Lexington Community Center, Town Hall, MIT Lincoln Labs, Wilson Farms, and public and private schools. Parks and recreation areas are also important destinations, including the Lincoln Park, Lower Vine Brook, Willard's Woods, Beaver Brook, Whipple Hill, Minuteman National Historic Park, and the Arlington Reservoir and Great Meadow. Pedestrian and bicycle facility recommendations considered access to and through these areas to make it more comfortable for people to choose to bike or walk to these destinations.

The shopping, eating, and cultural amenities in Lexington Center creates the pre-eminent destinations for bicyclists and pedestrians in Lexington.

Figure 9 Existing Paths and Destinations

Source: MassGIS, MassDOT, MAPC, Town of Lexington

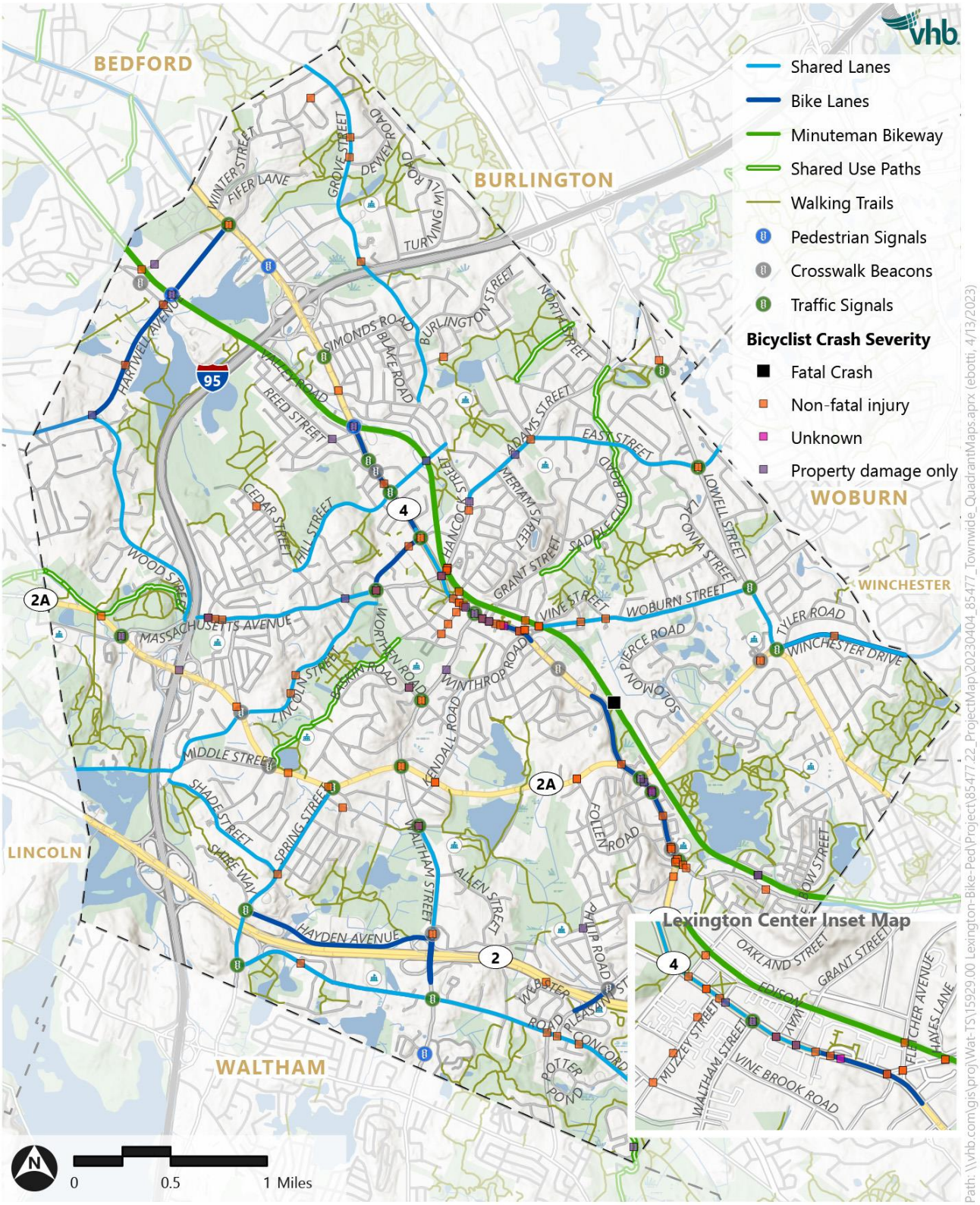
2.6 Pedestrian and Bicycle Crashes

Safety for people who ride bicycles, walk, operate a wheelchair, or use micromobility is a focus of the Town-wide Bicycle and Pedestrian Plan. Bicycle and pedestrian crash data over a five-year period (2016-2021) was collected and analyzed as part of this project. The severity of those crashes was also reviewed to determine where injury crashes—i.e., required medical treatment and/or a trip to the emergency room—occurred. A total of 2,868 crashes (all modes) were recorded over the five-year period in Lexington. Out of these crashes, 37 were pedestrian crashes and 79 were bicycle crashes, accounting for 4.0% of all crashes.

Bicycle crashes are shown in Figure 10. Roughly 59% of the 79 crashes were injury crashes during the five-year period. Bicycle crashes were concentrated along major roadways, especially Massachusetts Avenue in Lexington Center, where 11 crashes occurred. A significant number of crashes also occurred at the intersection of Massachusetts Avenue and Pleasant Street. Bicycle crashes tend to occur on major roads with shared lane markings or bike lanes, where increased bicyclists would be expected. This includes Concord Avenue, Grove Street, Woburn Street, and Hartwell Avenue. There were also several crashes along Marrett Road/Route 2A, which has no bicycle facilities. One fatal crash was reported; occurring on the Minuteman Bikeway in 2019, when two cyclists collided.

Pedestrian crashes are shown in Figure 11. Per the pedestrian crash data collected, 78% were injury crashes. Crashes were concentrated along major roadways and in high-traffic pedestrian areas, such as Lexington Center. Another area with a significant number of pedestrian crashes is the intersection of Massachusetts Avenue and Pleasant Street. Other crashes were generally scattered around the town, mostly on major roads, but sometimes on local residential streets. There were no fatal pedestrian crashes recorded over the analysis period.

Figure 10 Bicycle Crashes (2016 – 2021)



Source: MassGIS, MassDOT, MAPC, Town of Lexington

Figure 11 Pedestrian Crashes (2016 – 2021)

Source: MassGIS, MassDOT, MAPC, Town of Lexington

3

Network Recommendations

This chapter highlights the stages of planning that have led to the final compendium of prioritized bicycle-, trail-, and pedestrian-facility recommendations and a strategy to help implement them. This includes development of the plan's goals, incorporating the existing conditions assessment (from the previous chapter), and consideration of stakeholder and community input to form the basis of the bicycle and pedestrian network in Lexington.

3.1 Developing the Bicycle and Pedestrian Network

Development of the bicycle and pedestrian network requires a methodology that considers the Town of Lexington's and stakeholders' goals for the plan, community input, an assessment of existing conditions (including gaps), and bicycle and pedestrian connectivity needs. Helping to form the network are the hundreds of bicycle and pedestrian facility recommendations that eliminate gaps, improve safety, and provide links to area destinations such as schools, business districts, parks, transit stops, places of employment, and historic/cultural sites.

Bicycle and Pedestrian Plan Goals

Through discussions with Town of Lexington staff, the TSG+, various stakeholders, and the general public, the project team developed five goals for the TBPP. These were used to guide the network-planning work, bicycle/pedestrian facility concepts, and the program-based recommendations. Goals were also used as the foundation of the evaluation criteria used to prioritize project recommendations. In aggregate, the goals support improved connectivity and safety for people walking, bicycling, using micromobility, or operating a wheelchair throughout Lexington. The five goals include:

- **SAFETY**: increase bicyclist and pedestrian safety with programs and infrastructure projects
- **CONNECTIVITY**: link neighborhoods with schools, business districts, bus stops, parks, playgrounds, conservation and open space and adjacent communities and the Town's existing network of paths, bikeways, and sidewalks
- **DESIGN:** encourage bicycling and walking with separated/protected facilities designed for all ages and abilities
- **ECONOMY:** promote local businesses and sustainable tourism with strategic bicycle and pedestrian investments
- **FEASIBILITY:** plan for project recommendations that minimize engineering challenges, can leverage funding opportunities, and build community support

Bicycle and Pedestrian Needs

Based on the documentation of current conditions for bicycling, walking, operating a wheelchair, or using a micromobility device, the Town is well suited to expand the current network of trails, on-street bike facilities, sidewalks, and road crossings to improve active transportation safety and access. To do so requires an understanding of user needs and the gaps within the current network of paths and trails, on-street bike routes, sidewalks, and road crossings, however.

Shared Use Paths and Trails

The Minuteman Bikeway spine forms the foundation of the off-road active transportation system in Lexington. Supplementing the Minuteman Bikeway are the many shared-use paths, trails, and walking paths that crisscross the Town with varying levels of connectivity. Combined, these off-road routes provide options for many residents to walk, bike, or roll to school or work, for errands, or for recreational trips. Elimination of the gaps between paths and trails is the primary need in Lexington:

- Gaps within the Lower Vine Brook trail itself (e.g., at Brookwood Road or at North Street) and lack of seamless connectivity to the Minuteman Bikeway
- Missing link between the Lincoln Park/Old Reservoir path system and the Minuteman Bikeway, especially for people riding bicycles
- Missing link of safe bicycle passage between the Minuteman Bikeway and Lexington High School
- Lack of continuity between Minute Man National Park/Battle Road Trail and the Battle Green and/or Minuteman Bikeway in Lexington Center
- Missing link between trails within Beaver Brook Reservation and Concord Road and the neighborhoods to the north

On-street Bicycle Routes

Pleasant Street is an example of a busier road with needs for enhanced bicycle facilities but without space for striped bike lanes.

Lexington's on-street bicycle network is currently fragmented and features some routes that are not comfortable for novice bicyclists, children, or families riding bikes. Additionally, members of the public have said that streets with shared lane markings are not an acceptable "facility" for bicycling and need to be upgraded to dedicated bike facilities. A well-connected bicycle network in Lexington will likely include a mix of both on-road and off-road facilities. Bike lanes—ideally separated or buffered, but otherwise providing a dedicated space for bicycling—are needed on roadways with modest-to-high traffic volumes (>3,000 trips/day). On lower volume, lower speed streets, however, shared lanes are possible with painted shared lane markings (aka sharrows) and signage. Also, many roadways, including some major connecting routes, have narrow pavement widths and generally preclude on-road bicycle facilities unless curb lines are moved. Widening streets will impact street right-of-way and utilities, leading to significant project expense and complexity. These streets typically have high speeds and volumes which make sharing the road with cars difficult and uncomfortable. As such, traffic calming elements may be best for narrower, collector streets to enhance comfort levels for bicyclists sharing the roadway with motor vehicles. In the long term, however, the Town should consider widening the roadway to accommodate dedicated bike lanes.

Sidewalks

Needs for the sidewalk network were identified by reviewing public input through the online survey, the map-markup activity at the first public meeting, discussions with stakeholder groups, and documenting the apparent gaps in the network where sidewalks end mid-block and/or are disconnected from sidewalks further into the network. Connections to key destinations are also critical when considering sidewalk gaps, to allow safe and comfortable passage to places such as commercial areas, parks, and schools. In addition to new sidewalks, sidewalk improvements are needed in different places to address maintenance issues and narrow or ADA-deficient sidewalks. Although some sidewalks are needed in residential areas, there are still major sidewalk needs on some major roads, which have higher traffic volumes and speeds that making walking along them unsafe without a separated pedestrian facility.

Crosswalks

The primary sources used to determine locations of new or improved crosswalks included public input from the online survey and public meetings, and the intersections identified as needing new crosswalks or improvements by the planning team. Another source was the ACROSS Lexington Trail Network[17], which identified areas in the network where crosswalks exist to facilitate travel through the network, and locations where crosswalks are still needed to assist with network connectivity.

17 See: https://www.lexingtonma.gov/227/ACROSS-Lexington-PDF-Brochure-Map

Crosswalk improvements were identified based on public input from the public survey and through the map-markup activity from the first public meeting. Requested crosswalk improvements often included locations where people are concerned about speeding, lack of motorist yielding, locations where the crosswalks have not been updated to continental/zebra crosswalks, or there are sight distance issues.

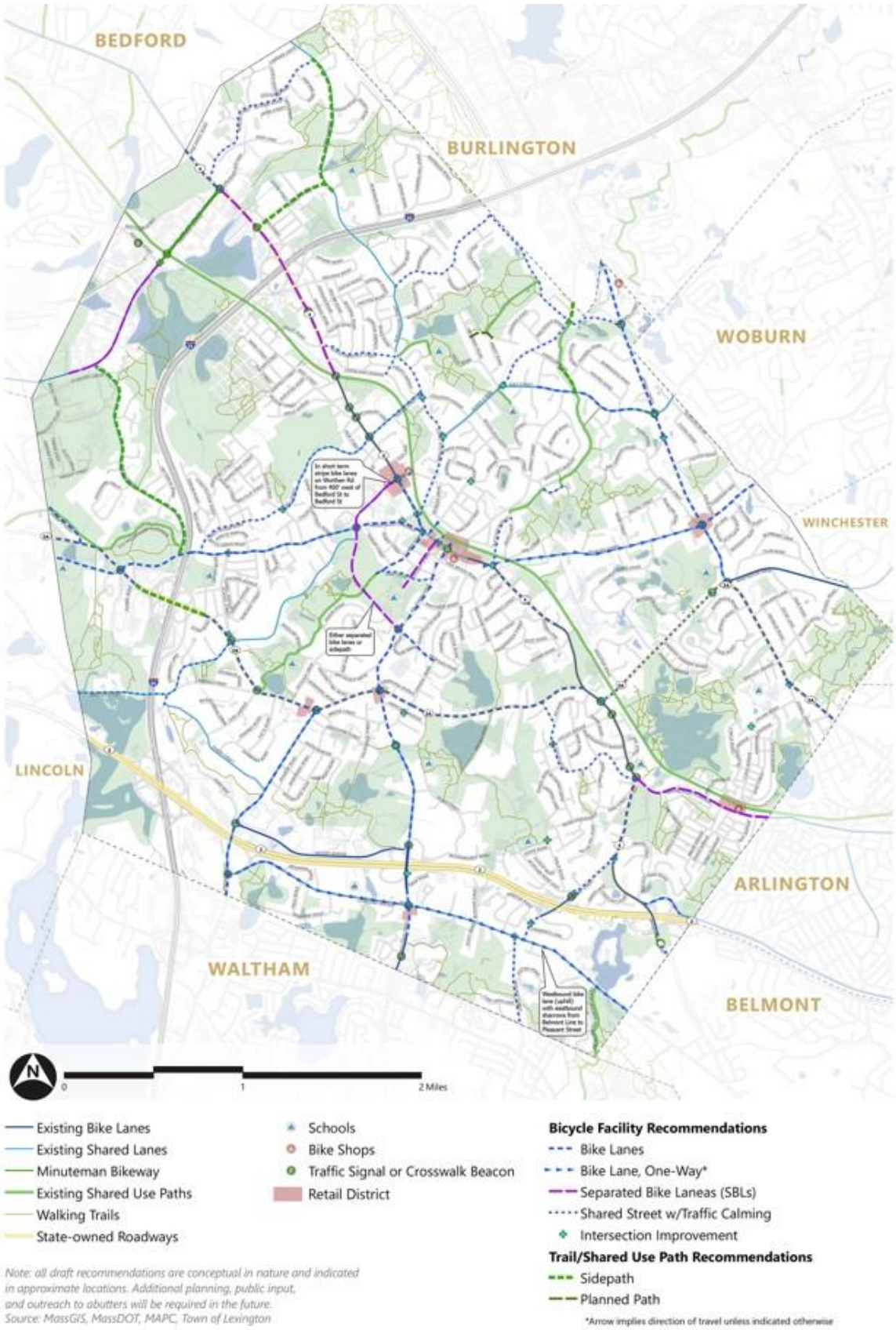
3.2 Bicycle Network Recommendations

Based on the assessment of existing conditions, desired links to destinations, and the needs described above, the planning team developed recommendations for a well-connected bicycle network. The network is comprised of a mix of shared use paths (through open space and within roadway ROWs), roadways with shared lanes (some with traffic calming measures) and striped bicycle lanes. The latter features separated bicycle lanes (SBLs), standard 5-foot-wide bike lanes in both directions, and one-way uphill climbing lanes. In most cases, the one-way bike lanes are intended to be short-term improvements where current roadway width precludes bike lanes on both sides of the roadway, e.g., Concord Avenue or Woburn Street. Many of the bike lane recommendations can be incorporated into scheduled roadway maintenance and/or repaving projects with minimal additional funding.

Bicycle network recommendations include several discrete improvements at intersections intended to improve safety and access for bicyclists and pedestrians. This ranges from tightening corner turning radii to slow traffic, to striping green bike crossings adjacent to crosswalks, to a full reconstruction to square off intersections, simplify the intersection geometry, and/or dramatically reduce bicycle/pedestrian crossing distances.

The Mass Ave/Woburn St/Fletcher Ave/Winthrop Rd intersection is very complex and creates challenges for bicyclists and pedestrians to navigate one of the key gateways to Lexington Center.

Figure 12 Bicycle Facility Recommendations



Bicycle Facilities Toolkit

The TBPP includes a "toolkit" of facility categories that comprise the recommended bicycle network. The toolkit is intended to help the Town of Lexington Public Works Department and Planning Office staff create more bike-friendly roadways, and to provide consistency of bicycle facility design treatments. The descriptions and images below are not intended to impose inflexible standards and should be considered on roadways throughout the town where future improvements are recommended. Note that the examples presented in the Bicycle Facilities Toolkit should not be considered a substitute for more thorough evaluation by Town staff and/or their design consultants. They may require further analysis and engineering judgement based on local conditions and community concerns and are intended to complement other state and national design manuals, including:

- Manual of Uniform Traffic Control Devices MUTCD (2009)
- AASHTO Guide for the Development of Bicycle Facilities (2012)
- Federal Highway Administration (FHWA) Separated Bike Lane Planning and Design Guide (2015)
- MassDOT Separated Bike Lane Planning and Design Guide (2015)
- FHWA Bikeway Selection Guide (2016)
- Guidance to Improve Pedestrian and Bicyclist Safety at Intersections, National Cooperative Highway Research Program (NCHRP), 2020

Bike Lanes

Bicycle lanes designate a lane for the exclusive use of bicycles via roadway pavement markings and signage. Reducing travel lane width to 10'-11' provides space for standard 5'-wide bicycle lanes. They typically are added to roads with extra wide travel lanes or, in some cases, to replace parking where demand is low. When bike lanes lie adjacent to on-street parking, if space is available, a wide parking aisle or 2' buffer between the bicycle lane and the parking aisle decreases the likelihood that bicyclists will be struck by opened car doors of parked vehicles.

Bike Lane, One Way

Similar to what is described above but only in a single direction due to constrained pavement width. Typically, the bike lane is incorporated in the uphill direction and used as a climbing lane. In the downhill direction—where bicyclists riding at higher speeds can theoretically "keep up with traffic"—shared lane markings (aka sharrows) and signage are included. Along undulating roadways, the bike lane should be maintained in the direction that is predominantly in the uphill direction. Only where the slopes change direction for more than 1,000 linear feet

should the bike lane direction be reversed. This ensures more predictable and consistent treatment for people both driving and riding a bicycle.

Separated Bike Lanes (Directional)

Directional Separated Bike Lanes (SBLs) run on each side of the roadway, at street-level, and use a variety of methods for visual or physical separation from passing traffic. A striped buffer plus a motor vehicle parking aisle, flexible delineator posts, or other vertical elements provide separation from motor vehicle traffic. SBL treatment is one of the best ways to create an "all ages and abilities" bicycling environment on busy streets such as Mass Ave, Worthen Road, or Bedford Road.

Separated Bike Lanes (Bi-directional)

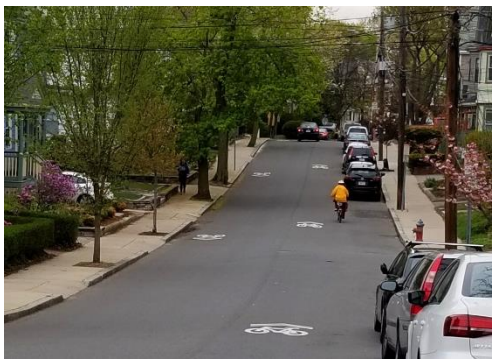
Bi-directional SBLs allow two-way travel for bicyclists on one side of the street. The bike lanes are typically 10' wide (total) with an adjacent, 2'-3' wide buffer. Additional design considerations at driveway and side-street crossings are required to reduce conflicts. Bi-directional SBLs work best on:

- one-way roads such as Muzzey Street,
- roads with long blocks and few curb cuts, and;
- roads with destinations that lie primarily on one side of the street.

According to FHWA's Developing Crash Modification Factors for SBLs (FHWA HRT-23-078) report, incidence of crashes can be reduced by 50% when delineator posts are also included within the striped buffer and up to 64% when a more solid vertical elements such as a concrete barrier or planter boxes are included. See: https://highways.dot.gov/research/publications/safety/FHWA-HRT-23-025

Shared Street with Traffic Calming

A shared street includes general purpose travel lanes marked frequently with shared lane markings (SLM and aka sharrows) used to encourage bicycle travel and proper bicyclist positioning within the lane. Under many conditions, SLMs may be placed in the middle of the lane to discourage unsafe passing by motor vehicles. SLM's are ideally used on low-volume roads with prevailing traffic speeds of <25 mph and are not to be used on roadways with posted speeds greater than 35 mph. For collector roads with 30 mph posted speed limits, traffic calming measures such as speed humps or



chicanes should be considered to create a more comfortable environment for less experienced bicyclists.

Intersection Improvements

In the context of the TBPP, Intersection Improvements include a variety of design revisions at an intersection to improve access and safety for bicyclists and pedestrians. Options include:

- Green bike crossings (see photo)
- Reduction of corner radii to slow turning traffic
- Bump outs, potentially with rain gardens
- Full intersection reconstruction/"T-ing" the roadways

Sidepath

Whereas shared-use paths run within former rail corridors, along rivers, and through parks, sidepaths are located adjacent to and parallel with a roadway. Sidepaths can offer a high-quality experience for pedestrians and bicyclists of all ages and abilities compared to on-road facilities in busier traffic environments. Additional design considerations at driveways and side street crossings are also needed for sidepaths to address conflicts between bicycles going in two directions and motor vehicles.

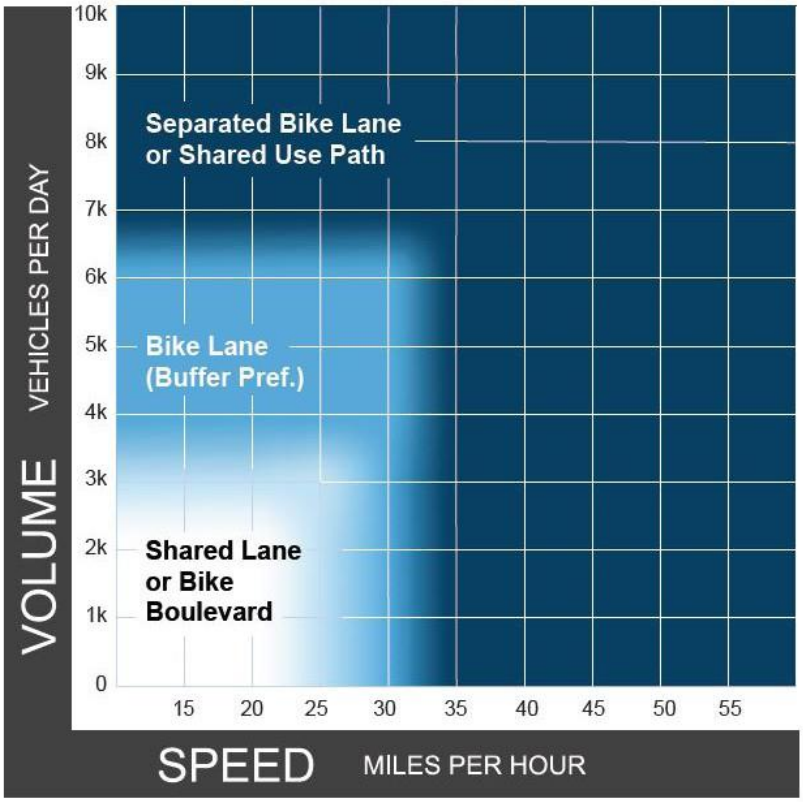
Supplemental Bicycle Network Recommendations

To help implement and support the individual roadway recommendations that form Lexington's future bicycle network, a handful of base-level recommendations should be considered.

- All local roadways should include 10' wide travel lanes. Along MBTA bus routes and/or roadways with heavy truck traffic should be 10.5'-11' wide depending on available space. These slightly narrower lane widths can provide additional space for striped bike lanes and/or a wider road shoulder without impacting roadway capacity or safety.[18]
- For roadways recommended for future bicycle lane treatment, green pavement markings should be considered at locations where conflicts between bicyclists and motor vehicles are more likely. This includes at all cross streets, at commercial driveway curb cuts, such as Bedford Street approaching Worthen Road and at locations where motor vehicles cross the bike lane to access a right turn lane such as the intersection of Maguire Road and Hartwell Avenue.

18 There are a number of studies that indicate narrower traffic lanes—even as low as 9 feet—do not impact traffic flow or lead to increased side swipe or other motor vehicle crashes. Many show 10'-wide lanes lead to slower speeds and enhanced safety for bicyclists. See: JHU-2023-Narrowing-Travel-Lanes-Report.pdf and https://journals.sagepub.com/doi/10.3141/2027-06

- Where bicycle lanes end, warning signs should be provided for both bicyclists and drivers. Preferred direction of travel should be marked for inexperienced bicyclists, especially near schools.
- According to FHWA's Bikeway Selection Guide matrix below (see Figure 9, page 23 of the Bikeway Selection Guide (dot.gov)), standard 5'-wide bike lanes should be used on roads with traffic speeds below 35 mph and/or with traffic volumes of less than 7,000 vehicles per day. As such, where bike lanes are recommended along roadways with posted speed limits that exceed 35 mph (e.g., Waltham Street between Brookside Ave and Marrett Road), consideration should be taken to either widen the roadway to accommodate SBLs or a shared use path, or efforts should be made to slow traffic with a lower posted speed limit and/or traffic calming measures.



3.3 Pedestrian Network Recommendations

Based on the assessment of existing conditions, desired links to destinations, and the needs described in section 3.1, the planning team developed recommendations for a well-connected pedestrian network. The network is comprised of a mix of shared use paths (through open space and within roadway ROWs), walking trails, new and improved sidewalks, new and improved crosswalks, and the intersection improvements described in the Bicycle Network Recommendations. These include tightening corner turning radii to slow traffic, adding corner bump outs, or a full reconstruction to square off intersections, simplify the intersection geometry, and/or dramatically reduce pedestrian crossing distances.

Figure 13 Pedestrian Facility Recommendations

Pedestrian Facilities Toolkit

The TBPP includes a "toolkit" of facility categories that comprise the recommended pedestrian network. The toolkit is intended to help the Town of Lexington Public Works and Planning Department staff improve pedestrian comfort and safety on Town roads, especially near schools, parks and senior centers. Many of these improvements can be incorporated into scheduled roadway maintenance and/or repaving projects without a high level of additional funding.

The descriptions and images below are not intended to impose inflexible standards and should be considered on roadways throughout the town where future improvements are recommended. Note that the examples presented in the Pedestrian Facilities Toolkit should not be considered a substitute for more thorough evaluation by Town staff and/or their design consultants. They may require further analysis and engineering judgement based on local conditions and community concerns and are intended to complement other state and national design manuals, including:

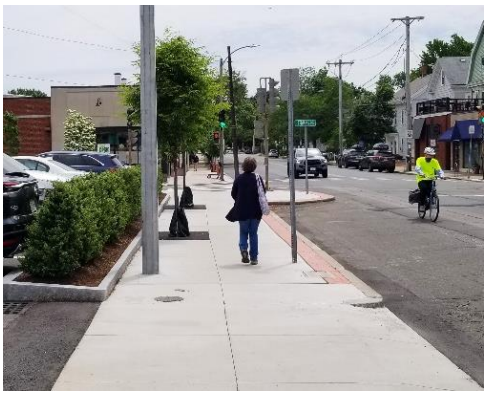
- Manual of Uniform Traffic Control Devices MUTCD (2009)
- AASHTO Guide for the Planning, Design and Operation of Pedestrian Facilities (2021)
- ITE Resource Guide to Traffic Calming Measures[19]

Walking Paths and Trails

The path and trail recommendations within the Lexington TBPP range from rustic walking paths—2'-5' wide dirt or woodchip paths—to 8'-10' wide stonedust paths that are fully accessible and can accommodate both pedestrians and bicyclists. Although the precise alignments for these future paths and trails are not fully articulated in this plan, high-level recommendations are made for improved and new trails through public properties managed by the Lexington Conservation Commission, Lexington Public Schools, the Recreation Department, Select Board and other Town-owned parcels.

19 See: https://www.ite.org/technical-resources/traffic-calming/traffic-calming-measures/

Sidewalks (Improved and New)



Sidewalks in residential neighborhoods should be at a minimum of 5 feet wide but can be 4 feet wide in constrained areas. A 4'-8' wide planted buffer should be planned between the sidewalk and the roadway where possible. This buffer improves the walking environment, enhances livability of the neighborhood, and can act as a furniture zone for utility poles, benches, and mailboxes. Where off-street parking sits at or near the edge of a parcel adjacent to a sidewalk, a landscaped buffer should be considered.[20] Per the photo at right, this provides a more welcoming environment for pedestrians and ensures that car bumpers do not encroach into the sidewalk space.

Crosswalks (Improved and New)

Where they aren't already in use, hi-visibility crosswalks should be striped at key pedestrian crossing locations and at signalized intersections. They should not strand pedestrians, however, and should lead to sidewalks on both sides or at least pedestrian safety around the corner if a sidewalk is not present. A piano key (aka "continental") or striping pattern enhances visibility of the crosswalk relative to a simple pair of perpendicular lines which are difficult for drivers to perceive. Except at signalized intersections, crosswalks should be signed with a double sided W11-2 PEDESTRIAN CROSSING SIGN and W16-7p ARROWS assembly supplemented with R1-6 IN-STREET PEDESTRIAN CROSSING SIGN which increase drivers' awareness of the crosswalk, especially at night (as clearly displayed in the photo of a crosswalk on Adams Street at Hathaway).

Pedestrian Safety Countermeasures

The treatments included in the Pedestrian Facilities Toolkit illustrate the variety of design treatments for use along roadways, at intersections, and at pedestrian crossing locations in Lexington. Selection of the appropriate treatments is based on a variety of factors including the land use context, street width, number of travel lanes, and the speed and volume of roadway traffic. Most treatments have been shown to improve pedestrian safety as suggested in the FHWA Proven Safety Countermeasures report from 2008 and 2017[21].

As Town staff seek the appropriate pedestrian facility for the improved and new crosswalks within the Pedestrian Network, they should focus on 1) motor vehicle traffic volume, 2) traffic speeds, and 3) the number of travel lanes on a given roadway.

20 Made need to be explored as an amendment to Lexington's Zoning Bylaw since these buffers would likely sit outside of the public right of way

21 See: https://safety.fhwa.dot.gov/provencountermeasures/

Options for determining the appropriate pedestrian facility treatment at road crossings—either raised crosswalk, curb extensions, median refuge island, RRFB, or others—is presented in the table on the following page. "Table 1" is pulled from FHWA's 2018 *Guide for Improving Pedestrian Safety at Uncontrolled Crossing Locations* (aka the "STEP Guide"). The STEP Guide's table includes a matrix broken down by the four roadway conditions including traffic volume, speed, number of lanes, and presence of a raised median. **Note that Table 1 below should be considered guidance only; the professional judgment of a licensed transportation engineer is required before the pedestrian treatment is formally selected and implemented.**

Table 1. Application of pedestrian crash countermeasures by roadway feature.

Roadway Configuration	Posted Speed Limit and AADT								
	Vehicle AADT <9,000			Vehicle AADT 9,000–15,000			Vehicle AADT >15,000		
	≤30 mph	35 mph	≥40 mph	≤30 mph	35 mph	≥40 mph	≤30 mph	35 mph	≥40 mph
2 lanes (1 lane in each direction)	● 2 4 5 6	● 5 6 7 9	○ 5 6 ● 9	● 4 5 6	● 5 6 7 9	○ 5 6 ● 9	● 4 5 6 7 9	○ 5 6 7 9	○ 5 6 ● 9
3 lanes with raised median (1 lane in each direction)	● 2 3 4 5	● ◉ 5 7 9	○ ◉ 5 ● 9	○ 3 4 5 7 9	○ ◉ 5 ● 9	○ ◉ 5 ● 9	○ ◉ 4 5 7 9	○ ◉ 5 ● 9	○ ◉ 5 ● 9
3 lanes w/o raised median (1 lane in each direction with a two-way left-turn lane)	● 2 3 4 5 6 7 9	● ◉ 5 6 7 9	○ ◉ 5 6 ● 9	○ 3 4 5 6 7 9	○ ◉ 5 6 ● 9	○ ◉ 5 6 ● 9	○ ◉ 4 5 6 7 9	○ ◉ 5 6 ● 9	○ ◉ 5 6 ● 9
4+ lanes with raised median (2 or more lanes in each direction)	● ◉ 5 7 8 9	● ◉ 5 7 8 9	○ ◉ 5 8 ● 9	○ ◉ 5 7 8 9	○ ◉ 5 ● 8 ● 9	○ ◉ 5 8 ● 9	○ ◉ 5 ● 7 8 ● 9	○ ◉ 5 8 ● 9	○ ◉ 5 8 ● 9
4+ lanes w/o raised median (2 or more lanes in each direction)	● ◉ 5 6 7 8 9	○ ◉ 5 ◉ 7 8 9	○ ◉ 5 ◉ 8 ● 9	○ ◉ 5 ◉ 7 8 9	○ ◉ 5 ◉ ● 8 ● 9	○ ◉ 5 ◉ 8 ● 9	○ ◉ 5 ◉ ● 7 8 ● 9	○ ◉ 5 ◉ 8 ● 9	○ ◉ 5 ◉ 8 ● 9

Given the set of conditions in a cell,

\# Signifies that the countermeasure is a candidate treatment at a marked uncontrolled crossing location.

● Signifies that the countermeasure should always be considered, but not mandated or required, based upon engineering judgment at a marked uncontrolled crossing location.

○ Signifies that crosswalk visibility enhancements should always occur in conjunction with other identified countermeasures.*

The absence of a number signifies that the countermeasure is generally not an appropriate treatment, but exceptions may be considered following engineering judgment.

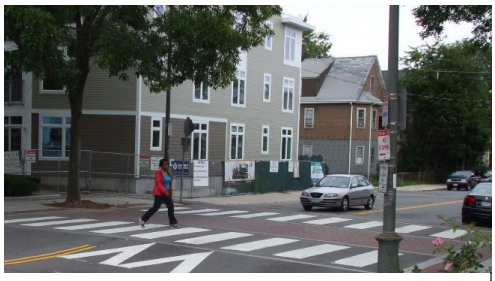
1 High-visibility crosswalk markings, parking restrictions on crosswalk approach, adequate nighttime lighting levels, and crossing warning signs
2 Raised crosswalk
3 Advance Yield Here To (Stop Here For) Pedestrians sign and yield (stop) line
4 In-Street Pedestrian Crossing sign
5 Curb extension
6 Pedestrian refuge island
7 Rectangular Rapid-Flashing Beacon (RRFB)**
8 Road Diet
9 Pedestrian Hybrid Beacon (PHB)**

*Refer to Chapter 4, 'Using Table 1 and Table 2 to Select Countermeasures,' for more information about using multiple countermeasures.

**It should be noted that the PHB and RRFB are not both installed at the same crossing location.

Raised Crosswalks

Raised crosswalks (aka speed tables) place the pedestrian crossing at the same grade as the adjacent sidewalks and should incorporate the high-visibility striping described above. With painted chevrons on the ramp up, raised crosswalks create a visual cue that forces drivers to slow down on the approach and function similarly to a speed hump.



Crosswalk with Speed Hunps

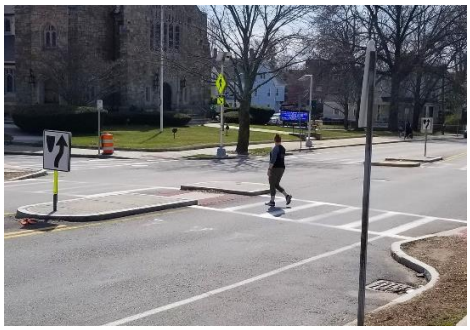
In lieu of a raised crosswalk, a similarly-effective treatment could include a pair of speed humps that flank an existing or recommended new crosswalk. This design very effectively slows motor vehicle traffic on Middleby Road at the Vine Brook Path crossing to Bridge Elementary School.

Curb Extensions/Bump Outs

Curb extensions improve visibility for those waiting to cross a roadway and reduce the crossing distance for pedestrians. They also help to calm traffic by creating a visual "pinch point" in the roadway and reducing the typical turning radius for motor vehicles. They are most typically used in conjunction with on-street parking lanes.

Median Refuge Islands

Median refuge islands are protected spaces for pedestrians in the center of a street, especially critical for 4 or 6-lane roads. They provide an opportunity for pedestrians to pause between directions of traffic, obviating the need to wait for traffic to stop in both directions before crossing a street. According to FHWA's Proven Safety Countermeasures report, they reduce crosswalk-related crashes involving pedestrians by 56%.



Rectangular Rapid Flashing Beacons

Rectangular Rapid Flashing Beacons (RRFBs) are pedestrian-actuated warning beacons located at unsignalized intersections or mid-block crossings. The increase motorists' awareness of pedestrians and work well in conjunction with curb extensions and high-visibility crosswalks. According to FHWA's Proven Safety Countermeasures report, they reduce crosswalk-related crashes involving pedestrians by 69%.

Supplemental Pedestrian Network Recommendations

To help implement and support the individual roadway and intersection recommendations that form Lexington's future pedestrian network, the Pedestrian Facility Toolkit should be supplemented by a handful of base-level recommendations for both infrastructure and maintenance.

- All crosswalks at signalized intersections should include pedestrian countdown signals with an audible crossing beacon and lead pedestrian interval (LPI). Countdown signals with audible beacons help pedestrians know when it is safe to cross and how much time remains for the crossing interval. With the countdown signal heads installed, an LPI (see photo) can be incorporated easily into the signal cycle. The LPI provides a 3-5 second interval prior to a green light so that pedestrians can begin their crossing movement before turning motor vehicles. According to FHWA's Proven Safety Countermeasures report, countdown signals with LPI's reduce crosswalk-related crashes involving pedestrians by 60%.
- All crosswalk locations should be well lit so pedestrians are visible at night. It is estimated that roughly 75% of ped fatalities in the US occur after dark[22]. Crosswalk lighting not only increases conspicuity of pedestrians but allows them to avoid uneven or broken areas of pavement and increases the sense of comfort and security. Good lighting, at crosswalks and along sidewalks can improve the sense of place in a residential or commercial area.
- All crosswalks should be signed with, where appropriate, advanced warning signs; in addition, all crosswalks across or running parallel to/adjacent to collector and arterial roads with a minimum of 1,000 vehicle trips per day should be painted.
- Crosswalk signs as described above should be mounted on both sides of the sign pole so motorists have visual warning at each end of the crosswalk ahead from both directions of travel. Where crosswalks lie at stop-controlled intersections, a minimum 12" wide stop bar should be striped 4 feet in front of the crosswalk, ideally in line with the adjacent pole-mounted stop sign.
- A significant portion of pedestrian traffic is generated by those wishing to access public transit. During winter, pedestrian access to MBTA or Lexpress bus stops must be kept clear of snow and ice to ensure access. When reaching the bus stop in any weather condition, bus riders—especially seniors or those with a disability—deserve the opportunity to sit and be free from rain or snow. Shelters with benches should be considered at bus stops.

22 Gov's Hwy Assoc, Ped Traffic Fatalities by State: 2021 Prelim Data (Jan-Dec); see: https://www.ghsa.org/resources/Pedestrians22

3.4 Bicycle and Pedestrian Program Recommendations

As part of the process for developing the plan, the planning team reviewed existing policies and programs in the areas of Engineering, Encouragement, Education, Enforcement, Equity, and Evaluation, frequently called "the six E's". Where gaps exist in the six E's, recommendations were developed in each category. Besides gaps in existing policies and programs, the team identified potential additions or improvements. The tables below contain the policy and program recommendations for the Town—along with key stakeholders and regional partners—to consider in the short, medium, and long term. Lexington benefits from a wealth of knowledge and skill from the volunteers that participate in the Town's various advisory committees. Many were instrumental in starting programs and initiatives concerning pedestrian and bicycle mobility. The Town should continue to leverage their expertise as a resource.

The Six "E's"

- **Engineering:** Creating safe and connected on-street and off-road infrastructure for walking and bicycling in Lexington
- **Encouragement:** Fostering a culture that supports and encourages walking and bicycling to work or school, for recreation, and to do errands
- **Education:** Providing people with knowledge about legal and safe walking and bicycling and to build confidence
- **Enforcement:** Promoting safe and responsible behaviors on the road and build respect among all users
- **Equity:** Ensuring that investments in active transportation infrastructure and programs reach all corners of the town, with emphasis in areas with low-income populations or those with high numbers of children and/or seniors.
- **Evaluation:** Monitoring efforts to increase walking and bicycling in Lexington and adjusting when necessary.

Note on Staff and Budget Constraints

In recent years, maintaining staff capacity has been a challenge. Department of Public Works is often understaffed, as positions go unfilled and retirements leave gaps in experience and institutional knowledge. Unfortunately, this staffing difficulty extends into the private sector. Hiring consulting contractors has also been a challenge as they have similar staffing issues and often need extensive quality control.

Note on Budget Impacts

As we develop our bicycle and pedestrian network, the impact to the budget is not just the implementation; it is also the ongoing maintenance. Lexington will need to add to it capacity to its maintenance budget and staffing. The idea of a formula was discussed but not determined.

Engineering Policies and Programs (Design)

Program	Need	Recommendation	Leadership
Construction-related impacts to pedestrian and bicycle facilities	On occasion, street maintenance or construction operations can create hazardous conditions and/or block access for pedestrians, bicyclists, and people with disabilities.	Continue to incorporate temporary access into design plans for the construction phase for most projects. There are situations in certain areas that prohibit the ability to provide these accommodations	Public Works, Bicycle Advisory Committee, and Commission on Disability
Warning signs and/or pavement markings at discontinuous bike lanes	Instances where dedicated bike lanes terminate typically leave bicyclists with no advanced warning. Some riders may abruptly swerve into the nearby travel lane rather than carefully merge, creating a hazard. This transition is difficult for younger riders	Provide an advanced warning sign so both bicyclists and motorists know that a bicyclist merge is expected into the travel lane. To improve merging conditions, MUTCD W9-XX signs indicating "(Bike) LANE ENDS" with a "150 FT" plaque should be installed in all conditions where bike lanes terminate, e.g., Mass Ave westbound between Woburn and Grant Street or westbound at Hollow Lane. In areas near schools where inexperienced riders are present, sharrows or other guidance should be provided.	Public Works, Transportation Safety Group, and Bicycle Advisory Committee, Safe Routes to Schools
Green painted bike lanes in areas of high vehicle maneuverings	At intersections with bike lanes, cars often take up space designated for bicycles.	Similar to above, signs and green paint will help to alert both cyclists and driver.	Lexington Public Works, Engineering and Bicycle Advisory Committee
Integrate TBPP into Complete Street Policy and Workplans to create a biking and walking infrastructure policy.	Each year the town maintains the streets and sidewalks. The scheduled maintenance presents an opportunity to improve the bicycle and	Similar to the Integrated Building Design and Construction Policy, a walking biking policy would guide infrastructure and maintenance to consider opportunities for	Public Works, Conservation, Recreation Departments, Transportation Safety

Program	Need	Recommendation	Leadership
	pedestrian level of comfort with easy adjustments. Sometimes these opportunities are over looked.	implementation such reducing turning radii and crossing distances, placing accessible ramps in the direction of travel, and create safe landing zones for peds and bikes where practicable. This policy could also be used by developers proposing work	Group, and Bicycle Advisory Committee, Safe Routes to Schools, Commission on Disability, Transportation Advisory Committee

Engineering Policies and Programs (Public Works Department Efforts)

Program	Need	Recommendation	Leadership
Mobile App for Reporting Maintenance Issues *(to supplement the online reporting system)*	When out and about, residents don't always have a convenient method to report problems within the public right of way that impact people walking, bicycling and those with disabilities.	Development of a mobile phone app allows residents to report damaged sidewalks, pavement defects in bike lanes, and other potential hazards so that the Town can track work orders and maintenance requests to Public Works. Development is in progress and will be in place in the near future.	Lexington Public Works Department and IT Department
Repaving of the Minuteman Bikeway (MMBW)	Although not a focus of this study, public input expressed concern that the increasing popularity of the Minuteman Bikeway, the paved 10-foot-width can feel constrained for users, especially on weekends and in areas near Lexington Center.	In areas that are not constrained by adjacent wetlands, steep slopes or natural/cultural resources, the practice is to add a 2-foot-wide stone dust shoulders on one or both sides of the Bikeway during scheduled repaving projects. In the alternative a safer Mass Ave could provide a second option for experienced bicyclists.	Lexington Public Works Department, Conservation Commission, and the Bicycle Advisory Committee
Clearing snow and ice from sidewalks, bike lanes and bus stops	In current practice, all roads are cleared first and then the sidewalks. While the timing of clearing the roads and sidewalks depends on the duration and intensity of winter storms, typically sidewalks are cleared within 48 hours. In addition, many network sidewalks are cleared by other agencies such as MassDOT on Marrett Road.	The timing of snow clearance from roads (especially roads with bike lanes) and sidewalks could be based on demand and user safety. However, prioritizing needs to be done with efficiency in mind as moving the equipment arounds wastes time and resources. —.	Lexington Public Works Department, Human Services
Clearing snow and ice from sidewalks	There is a desire for sidewalks to be cleared quickly after a	Reconsider a bylaw that compels adjacent property owners to clear	Transportation Safety Group, Police, Lexington

Program	Need	Recommendation	Leadership
	storm. Lexington plows more sidewalks than many surrounding communities. Currently, the general bylaw requires sidewalks on commercial frontage to be kept clear by property owners. DPW clears the Center sidewalks in the first pass but keeping the sidewalks is the responsibility of the commercial property owners.	their sidewalk frontage. This will need to be a coordinated effort involving town staff, the community and community leaders. Some nearby communities require property owners to clear snow and ice from sidewalks. A strong bylaw and thoughtful enforcement may help keep sidewalks clear. However, there is skepticism as to whether this will clear sidewalks faster and keep them clear. If successful, this may enable DPW staff and equipment to clear snow and ice from sidewalks in high priority areas and sidewalks which front public property. Human Services is working to identify ways to help seniors shovel.	Public Works Department, Human Services *a by law was tried several years back, success will need to be coordinated with departments such as Human Services and Police, DPW.
Keeping the sidewalks and bus stops clear during freeze thaw cycles after storms or for storms too small for plow operations	Sometimes after the sidewalks have been plowed the freeze thaw cycle creates a condition that is difficult for pedestrians and pedestrian find alternative routes on the street with traffic.	Although a budget increase for additional equipment and staff, the Town could consider treating sidewalks similar to roads; if storm is icing or a storm is too small for removal operations they could instead be treated. This will require additional equipment and material purchases and will require additional overtime funds. Key sidewalks should be identified, expectations clearly set and will depend on weather conditions.	Lexington Public Works, Transportation Advisory Committee and Select Board.
Ice and snow build-up at the base of sidewalk pedestrian ramps	Due to the local climate's freeze/thaw cycle, puddles that form at the base of pedestrian ramps frequently freeze overnight and create a hazard for all pedestrians.	Pending Public Works staff capacity, where there are known problem areas sidewalk clearance should include particular attention to snow and other debris near sidewalk pedestrian ramps. Key locations should be identified and this can be monitored and worked into the plan.	Lexington Public Works Department, the Transportation Safety Group, and Select Board

Program	Need	Recommendation	Leadership
Late summer vegetation impeding pedestrian and bicycle mobility.	Overgrown vegetation will sometimes block sidewalk, paths, and bike lane segments, diminish sight lines at the MMBW and impact pedestrian and bicycle access, visibility, and safety. Over grown vegetation is often reported	Keeping overgrown vegetation in check, especially in late summer just prior to the new school year, should be part of Public Works sidewalk maintenance routine with known problem areas. If staff constraints are anticipated, consider bringing in a short-term landscaping company vendor. Town can conduct a campaign directed at property owners to keep vegetation out of sight lines.	Lexington Public Works Department, Conservation Department, Transportation Safety Group

Encouragement Policies and Programs

Program	Need	Recommendation	Leadership
Online promotion of walking and bicycling	Promoting Lexington as a place for people to choose to walk or bike for transportation and recreation can encourage more residents and visitors to choose not to drive for some trips. People are not sure whether or not they can get to their destination solely on sidewalks or bike lanes. People don't know what to expect.	Continue to promote the www.lexbikewalkbus.org website a specialty website just for getting around town without a car. Create a single map that focuses solely on travel without a car. The map and/or mobile app would feature sidewalks, paved trails, and paths; bike lanes, multiuse paths and side paths with bus stops included. This information could enable a non-car traveler to plan a safe and comfortable route. This app/map should be kept current through major construction projects.	Town Manager's Office, Planning Department and Transportation Services, Greenways Corridor Committee, Bicycle Advisory Committee, Transportation Advisory Committee, and Commission on Disability
Roadway User Courtesy Program	A better understanding of the needs of vulnerable road users, such as pedestrians and bicyclists. Enhanced courtesy between those driving, walking, and bicycling is intended to improve safety for all.	Perhaps called "Lexington Nice", the campaign can be modeled after the "Newport Waves" program in Newport RI. (NOTE: the Newport Waves program is propriety protected). The successful effort included a 1 min video which featured local personalities, street banners, and posters in storefront windows. See: https://bikenewportri.org/introducing-newport-waves/ The Town could host a video contest to kick off the campaign.	Town Manager's Office, Transportation Safety Group, Police Department, , Bicycle Advisory Committee, Friends of the Minuteman Bikeway. Transportation Advisory Committee, Commission on Disability Greenways Corridor Committee; School Department and SRTS

Program	Need	Recommendation	Leadership
Town-wide Bike Loop	Designate a loop route within Town limits on designated roadways via wayfinding signage.	Designated a bicycle loop within Town limits on designated roadways via wayfinding signage.	Lexington Public Works Department and Bicycle Advisory Committee
Walking or Bicycle Commuting for Town Employees	While Town staff are provided parking at no cost, the number of Town employees using transit, or walking or bicycling to work is low.	Provide incentives to Town staff to encourage active transportation; this can come in the form of financial incentives—e.g., Portland OR provides $25/month stipend for those who commit to walk or bike 4 days/week—and facilities, such as covered bike parking and shower/locker facilities where possible.	Town Manager's Office and Lexington Human Resources Sustainability Officer, Planning
Bike Parking at Schools	Some schools lack plentiful and quality bike parking, some of which should be covered (which currently only exists at LHS and the middle schools). The "grid" or "comb" style racks at some schools don't meet standards.	While most schools provide bike parking, others are lacking. Bike racks should meet current industry standards to make bicycle parking convenient, accessible, and secure.	Lexington Public Schools, Department of Public Facilities, Recreation Department, and Bicycle Advisory Committee
Bike Parking in the Center	Bicycle parking was added during the Centerscape project. However, residents feel more is needed.	A summer bicycle count may help clarify this issue. The Town should continue to work with landowners in the Center to provide bicycle parking particularly near the Minuteman Bikeway where people can park their bikes and walk to the businesses in the Center.	Department of Public Works, Center Committee, Bicycle Advisory Committee
Bike Parking Requirements for Development	Currently, Lexington's Zoning Bylaw only requires bike parking for large development projects and multifamily housing , leading to inadequate bike parking at some smaller development. Some developments were built before the Town enacted bicycle parking rules. Because these are preexisting it is difficult to bring older developments into compliance.	Consider expanding the Zoning Bylaw to include e-mobility device parking. Development of a bike parking guide similar to Arlington's or Cambridge's will help developers understand design issues and select products that meet industry standards[23]. As property owner improve their properties, depending on what they are proposing it may be an opportunity to bring the property into compliance	Lexington Planning Department, Building Department, Board of Appeals, Planning Board, Economic Development, and Bicycle Advisory Committee

[23] See the Association of Pedestrian and Bicycle Professionals Bike Parking Guide at: https://www.apbp.org/Publications or Arlington's Guide at: https://archive.org/details/Arlington_MA_ShowDocument_Id_48389/page/28/mode/2up

Program	Need	Recommendation	Leadership
Bike Parking Placement Around Town	There are areas of town that need more bicycle parking. Tricycles, e-bikes and cargo bikes are not well accommodated for parking	Parking for other mobility devices in addition to bicycle should be included in the above proposed bike parking guide. Areas for additional parking could be prioritized and funding sought from the Boston MPO	Lexington Bicycle Advisory Committee, Commission on Disability, Public Works and Public Facilities.
Encourage connections between private property	There are short cuts in town that provide an efficient routes away from traffic but some are on private land. These "cut-thrus" were not identified in this plan, but as developments are planned the Planning Board and planning staff may consider how these opportunities can be formalized.	The Greenway Corridor Committee, and other citizens has been particularly good at advising the Planning Board on desired easements. This practice should continue.	Lexington Planning Department, Planning Board, Transportation and Bicycle Advisory Committees, and Greenway Corridor Committee.
Artistic Bike Racks	Bike racks not only satisfy demand for bike parking but can strengthen the Town's brand.	New, creatively designed bike racks should be well placed and help to further Lexington brand as a historic destination for visitors and locals. See www.pinterest.com/downtownlaramie/ custom-bike-racks for an example from a small city in Wyoming.	Lexington Public Works Department, Economic Development, Historic District Commission, Lexington Council for the Arts, and Bicycle Advisory Committee
Bike Rack Request Program	In certain parts of Town there is a need for more bicycle racks. Businesses have often requested bicycle racks near their businesses.	The town could set up a request and approval system so business owners have easy access to the process. Town could seek a grant for purchase and installation	Transportation Safety Group Economic Development Office, Lexington Bicycle Advisory Committee

Education Policies and Programs

Program	Need	Recommendation	Leadership
Children walk and bike safety program	Elementary and middle school children do not always have a full understanding of traffic safety and laws for walking and bicycling.	Continue to foster more school-based "bike trains" and walking school buses and continue the local Safe Routes to School Program—with participation from the Police Department and materials from the MassDOT SRTS Tool Kit—to encourage participation at more schools with an emphasis on walk/bike safety courses. Continue to offer Bike Rodeos, Bike Smart, Smart Cycling, etc. Events are posted at www.lexbikewalkbus.org. LPS is working on including DESE approved pedestrian and bicycle safety curriculum	Lexington Public Schools, SRTS, Lexington Police, Transportation Services, and Bicycle Advisory Committee
Free Bike Safety Equipment	Some adults and children do not have helmets, lights, and other safety equipment on their bicycles.	Continue to promote free giveaways of bicycle helmets, lights, safety vests, ankle straps and other items at community events, at schools and/or community events.	Transportation Services, Lexington Police Department, Bicycle Advisory Committee and local advocates
Bicycle Maintenance Courses for Adults	Even teenagers and adults who feel comfortable riding a bike do not always know proper maintenance skills. Well-designed bike maintenance classes can build additional confidence and enthusiasm for bicycling for transportation on a regular basis	Existing classes are popular. Continue to promote bicycle maintenance for teenagers and adults. Class are posted on the www.lexbikewalkbus.org website	Transportation Services, Bicycle Advisory Committee and local advocates
Walk/Bike/Driver Safety Education Materials	Many motorists, bicyclists, and pedestrians lack information about safely interacting with other road users and current traffic laws. Materials developed by the Bicycle Advisory Committee and the Friends of the Lexington Bikeways were well received but are currently out of date.	Public outreach including mailings, fliers, and PSAs, can educate all roadway users about safe interactions; grants are frequently available for such materials. These potential funds could help to supplement efforts by advocates.	Transportation Safety Group, Police Department, Transportation Services, Transportation Advisory Committee, Bicycle Advisory Committee *MassBIKE and Bike League have good material

Program	Need	Recommendation	Leadership
Pedestrian and Bicycle Wayfinding to Local Destinations	Local residents and visitors to Lexington may not realize the close proximity of cultural and recreational destinations in the town.	As a follow-up to the new signs on the Minuteman Bikeway, a town-wide plan for additional destination wayfinding signs along ACROSS Lexington routes and other walk/bikeways should be considered. Lexington will need to find the balance of promoting economic development and courteous behavior with too many signs that cause sign fatigue and maintenance costs	Lexington Economic Development Office, Greenways Corridor Committee, Transportation Advisory Committee, and Bicycle Advisory Committee

Enforcement Policies and Programs

Program	Need	Recommendation	Leadership
Crosswalk Compliance	People driving frequently fail to yield to pedestrians in crosswalks.	Continued and additional enforcement efforts,[24] motorist education, and decoy (empty police car) operations could be considered to enhance compliance.	Lexington Police Department
Safe Routes to School Enforcement	People driving near schools—sometimes parents—sometimes speed or otherwise do not drive safely.	This is a constant concern at every school zone almost every week and is not specific to this bike/ped plan. See above.	Lexington Police Department
Truck Safety	Large trucks can present a hazard to pedestrians and bicyclists, sometimes threatening to pull bicyclists under their wheels.	Establish a Town policy requiring side guards, convex mirrors, and cross-over mirrors on large trucks owned and operated by the Town. Consider if legally allowed extending this requirement to for vehicles/companies bidding on town contract work	Lexington Public Works Department, Fire Department and Bicycle Advisory Committee

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Program	Need	Recommendation	Leadership
Traffic Calming	Speeding drivers can compromise the quality-of-life in some neighborhoods and lead to more dangerous conditions for people walking and bicycling.	Speeding is a constant concern. Considerable amount of time is spent at these problem areas to either deter the poor driving behaviors. Sometimes speeding is a few outliers. Physical alterations to the road are the most effective at reducing speeds. Feedback signs have proven to be effective when sited appropriately but over time they lose their effectiveness. The Town may consider instead, several mobile feedback signs that rotate locations over time.	Transportation Safety Group and Lexington Public Works Department
Bus Shelters	Comfort for bus riders is important to encourage walking and bus transit in all types of weather	Require bus shelters when development projects are proposed on bus routes and bus stop is adjacent to the development. The Town should provide design standards. The shelter in the Center was approved by several committees so could serve as guidance.	Lexington Planning Department, Transportation Services and Transportation Advisory Committee and Commission on Disability

Equity Policies and Programs

Program	Need	Recommendation	Leadership
Active transportation in proximity to multi-family residential development	Higher-density housing aims to promote new multi-family units, with some affordable units	To encourage high levels of walking, bicycling, and transit use, development permits should encourage connections to sidewalks, nearby trails, and on-street bike facilities.	Lexington Planning Department and the Planning Board
Active transportation in proximity to commercial development	Congestion during peak commuting hours near Lexington's commercial/manufacturing districts. This interferes with transit service efficiency, safety, adds to travel time and air pollution	To encourage high levels of walking, bicycling, and transit use, development permits should encourage connections to sidewalks, nearby trails, and on-street bike facilities. Parking ratios should discourage driving and incentivize alternative methods of commuting. Expand TDM to all developments	Lexington Planning Department and the Planning Board

Evaluation Policies and Programs

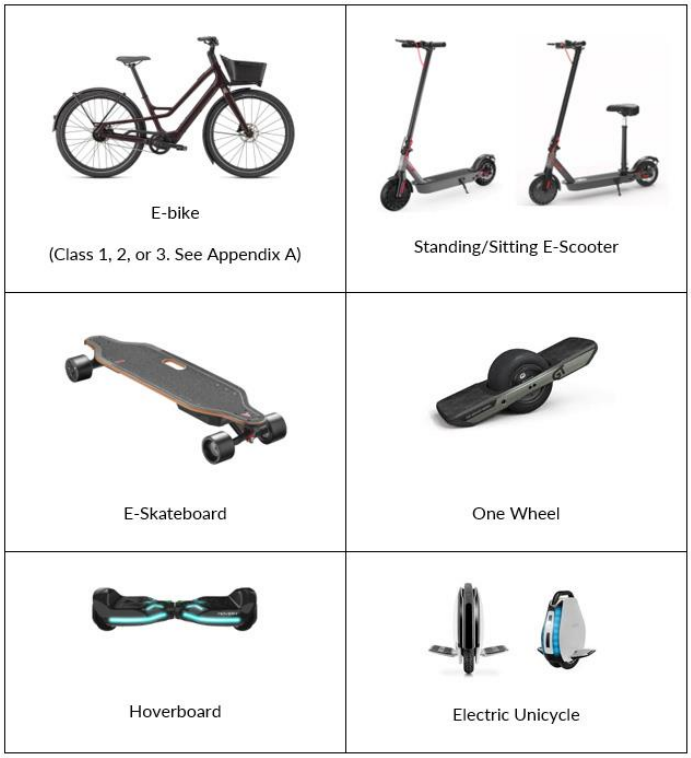
Program	Need	Recommendation	Leadership
League of American Bicyclists (LAB) Bicycle Friendly Community (BFC) Program	Currently, the Town of Lexington has been designated as a Bronze-level BFC by the LAB. Aspiring to reach the next level (Silver) can provide the organizing policy for various improvements that will require evaluation to present to the LAB in the next certification round.	Town staff to develop a checklist of projects and programs aimed to achieve silver-level BFC designation in 3-5 years. While this is a marker of progress, the application procedure is burdensome on staff. It would be helpful if data collection could be automated or a volunteer effort or perhaps consider a different designation.	Lexington Bicycle Advisory Committee
Pedestrian and Bicycle Data (A)	Compared with motor vehicle counts, there is very little data related to the number of people walking and bicycling for work, for recreation, or for errands.	To supplement Bicycle Advisory Committee's annual counts on the Minuteman Bikeway, develop a regularly scheduled, pedestrian and bicycle count program beyond the Bikeway (e.g., Mass Ave or Waltham Street).	Greenways Corridor Committee, Transportation Advisory Committee, and Bicycle Advisory Committee
Pedestrian and Bicycle Data (B)	There is very little data related to the number of children walking, bicycling, and scootering to school on a regular basis.	To better understand how school children at all levels are reaching school, surveys should be taken at least once a year but ideally in both the fall and the spring. Coordination with individual school Principals will be needed. A survey is expected Spring of 2024	Transportation Services, Lexington Public Schools, and Transportation Advisory Committee
Walk/Bike Safety Audits at Lexington High School	As planning for the new high school building begins, the Town may need to have a better understanding of areas where hazards exist for students walking or biking to school.	Existing walk/bike safety audits should be used to help inform, the planning and design work by the Town's consultant architect/engineer. Attention should be paid to students arriving by methods other than a car.	Lexington Public Schools and the Transportation Safety Group
Update Pedestrian Bicycle Plan	During implementation actions of Lexington's first Bike Ped Plan it is likely we will see ways to improve efficiency of our actions and the criteria of prioritization may change.	The TBPP action plan and prioritization list should be undated every three years to reflect progress and new information. The project criteria should be reviewed every 5 years	Transportation Safety Group, Commission on Disability Greenways Corridor Committee, Transportation Advisory Committee, and Bicycle Advisory Committee

Additional pedestrian and bicycle facility improvements along Muzzey Street and others leading to the Lexington High School campus could result from safety audits conducted as part of the high school redesign process.

3.5 Policy Recommendations Related to E-bikes and E-Micromobility

As part of the TBPP, the planning team explored ways for the Town of Lexington to "address challenges related to the increasing number and type of electric-assist bicycles and other E-vehicles needing accommodation," and is seeking "recommendations as to appropriate policy to ensure safety of all users." (from the original RFP for the TBPP)

This section of the TBPP report summarizes a much longer technical memorandum found in Appendix B that includes a full overview of the policy, infrastructure, and enforcement contexts nationally, throughout New England, and in Lexington for what are often called "E-micromobility" devices. The full memorandum also offers recommendations to manage common concerns with these electric-powered transportation devices and small-scale vehicles. The E-micromobility devices shown below are included in the analysis:



- E-bicycles (Classes 1-3; also referred to throughout this memorandum as "E-bikes")
- E-scooters (standing or sitting)
- Other E-Micromobility Options
- E-skateboards (including One Wheels)
- Hoverboards
- E-unicycles

In general, there is considerable variability in how E-micromobility devices are regulated in the U.S. (with the exception of E-bikes). While some devices (E-skateboards, in particular) still operate in an ambiguous legal zone, best practice appears to advise operators to behave like bicycle riders on public ways.

To summarize the technical memorandum's recommendations for Lexington:

- Since E-bikes and E-scooters are already regulated under Massachusetts state law, the plan recommends that the Town of Lexington follow state law and permit these devices to use all public ways open to bicycles, including the Minuteman Bikeway and all other shared use paths where bikes are already permitted.
- While the legality of E-boards may be uncertain, these devices are already appearing on public ways in Lexington. Lexington should adopt "rules of the road" for these devices that generally align with bicycle operational rules.

- Creating educational signs, handouts, stickers, web assets, etc. will permit the public to be educated on the behaviors the Town of Lexington would like to see practiced by E-micromobility users.
- Revise the current "No Motor Vehicles" signs at trailheads and intersections along the Minuteman Bikeway to explicitly allow for electric-assist bicycles and other micromobility devices. The additional plaque could say: "except e (electric)-assist".
- Defining micromobility and E-micromobility in Town ordinance will clarify that everything from a kick scooter to an electric skateboard is addressed by local transportation policy.
- Continuing discussions with all of the Minuteman Bikeway communities and adjacent towns regarding what other communities, such as Boulder Colorado, have done to regulate human- and electric-powered micromobility users. This will permit Lexington residents and officials to explore, discuss, and address the use of these new devices on public ways.
- Focus on moderating behavior through encouragement and education.
- Expecting more growth in these modes, and planning to expand infrastructure to support them, will enable the Town to position itself for a greener, less auto-dependent future.
- Continue to foster an expectation of reasonable behavior and speeds on the Minuteman Bikeway through the practice of community engagement and good riding behavior, while deterring negative practices on the path. The Lexington Police Department will continue this practice as staffing allows to make the path safe and enjoyable for all who use it.

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4

Prioritization

To help the Town of Lexington prioritize the nearly 300 bicycle, pedestrian, and trail facility recommendations, the TBPP used 12 criteria to score and rank them. The results of the Prioritization process are not set in stone. The intent is to inform project funding and future implementation of the facility recommendations. Permitting, engineering complexity, and the need for public input for most projects are equally important as the prioritization score and rank. This may result in some high scoring projects taking several years to implement and/or medium-to-low scoring projects becoming a reality sooner rather than later.[25]

4.1 Evaluation Criteria

The 12 evaluation criteria sprung from the five Bicycle and Pedestrian Plan goals—Safety, Connectivity, Design, Economy, and Feasibility—described in Chapter 3. They include a mix of two types of criteria:

- **Quantitative:** scores that can be derived from data sources—primarily GIS—such as scores based on the number of nearby crashes and the linear distance/proximity to public and private schools, transit lines, and retail districts
- **Qualitative**: scores that the planning team used their judgement to determine, such as whether a recommendation helped close a gap in the current network, its level of engineering complexity, its impact to on-street parking, and whether the recommendation had received community support during or prior to the TBPP effort.

25 This is especially the case for bicycle and pedestrian facility recommendations that coincide with Public Works' regular repaving or repair program and roadway corridor projects that have been, or will soon be, programmed into the Town's Capital Budget

4.2 Methodology and Weighting

The prioritization methodology incorporates hierarchy among the 12 criteria to further reflect what is important to the Lexington community. Incorporating feedback from Town staff, the TSG+, and from public meeting #2 on June 8. Each criterion was given a weight of 1, 2, or 3 to highlight the critical role that, for instance, well-designed bicycle and pedestrian infrastructure near K-12 schools plays for town residents. The list of criteria, the weighting, and maximum points allocated for each criterion is shown below.

Table 3 Draft Evaluation Criteria

Plan Goals	Criteria (up to 5 points each) ***Note: qualitative criteria shown in Italics***	Weighting	Max. Weighted Point Total
1: SAFETY	Proximity to reported bicycle/pedestrian crashes	2	10
	Motor vehicle volume along roadway	2	10
2: CONNECTIVITY	*Addresses a key gap in the trail/bicycle/pedestrian network*	1	5
	Proximity to public or private school (K-12)	3	15
	Proximity to public park or conservation land entrance	2	10
	Proximity to transit line (MBTA or Lexpress)	2	10
3: DESIGN	*Recommendation promotes "all ages and abilities" by providing separation from motor vehicles*	2	10
4: ECONOMY	Proximity to retail districts	2	10
	Proximity to tourist/cultural destination	1	5
5: FEASIBILITY	*Level of engineering complexity*	2	10
	Impact to existing on-street parking	2	10
	Level of expressed community support	1	5
TOTAL			**110**

With the weighting established, the planning team developed a scoring rubric to determine scores for each criterion. This equated to scores of 0 through 5 for the criteria for each of the project recommendations. The highest score possible is 110 points. The detailed scoring rubric can be found in Appendix C.

4.3 Prioritized Table of Bicycle Recommendations

Using the prioritization methodology described above, scores were given to all infrastructure project recommendations found in the Lexington Town-wide Bicycle and Pedestrian Plan. Recommendations intended to improve safety and connectivity for people riding bicycles included recommendations for new or improved bicycle facilities—bike lanes and shared roadways—along with intersection improvements. The Prioritization tables on the following pages indicate the roadway location, the project recommendation, project "theme" (i.e., whether it provides connections along a longer corridor), project length, and evaluation score. Recommendations highlighted in yellow indicate those that lie along MassDOT roadways.

Table 4 Bicycle Facility Recommendations

Facility Name	Street1	Street2	Project Recommendation	Theme	Length (feet)	Project Score
Bicycle Facility Recommendations						
WORTHEN ROAD	MASSACHUSETTS AVENUE	WALTHAM STREET	Separated BL or side path		3,521	90
CONCORD AVENUE	BENJAMIN ROAD WEST	BELMONT TOWN LINE	Bike Lane		11,195	85
PLEASANT STREET/ROUTE 4/225	WATERTOWN STREET/ROUTE 4	MASSACHUSETTS AVENUE	Bike Lane		2453	84
MUZZEY STREET	MASSACHUSETTS AVENUE	LEXINGTON HIGH SCHOOL	Separated BL	cons MMBW - East to LHS	1692	83
WALTHAM STREET	WORTHEN ROAD	MASSACHUSETTS AVENUE	Bike Lane		2,823	83
CLARKE STREET	MASSACHUSETTS AVENUE	PARK DRIVE	Bike Lane	MMBW - East to LHS	1281	82
MASSACHUSETTS AVE	PLEASANT STREET/ROUTE 4/225	ARLINGTON TOWN LINE	Separated BL	Mass Ave East	4,256	81
BEDFORD STREET	LOIS LANE	MASSACHUSETTS AVENUE	Bike Lane		1,454	79
MARRETT ROAD/ROUTE 2A	KENDALL ROAD	WALTHAM STREET	Bike Lane		1042	79
WALTHAM STREET	MARRETT ROAD/ROUTE 2A	BROOKSIDE AVENUE	Bike Lane		1,709	79
WALTHAM STREET	WORTHEN ROAD	MARRETT ROAD/ROUTE 2A	Bike Lane		1,983	79
WORTHEN ROAD	MASSACHUSETTS AVE	BEDFORD STREET/ROUTE 4/225	Separated BL	MMBW - West to LHS	1,973	79
MARRETT ROAD/ROUTE 2A	MASSACHUSETTS AVENUE	KENDALL ROAD	Bike Lane		5331	77
MASSACHUSETTS AVE	BEDFORD STREET	WORTHEN ROAD	Bike Lane		2,083	77
WOBURN STREET	LOWELL STREET	MASSACHUSETTS AVENUE	Bike Lane		6,444	77
MASSACHUSETTS AVE	WORTHEN ROAD	INSTERSTATE 95	Bike Lane one way		5,027	75
DEPOT SQUARE,	MASSACHUSETTS AVENUE	MINUTEMAN BIKEWAY	Shared Street w/TC	MMBW - East to LHS	269	73
WALTHAM STREET	BROOKSIDE AVENUE	HAYDEN AVENUE	Bike Lane		3,076	73
FOLLEN ROAD	MASSACHUSETTS AVENUE	MARRETT ROAD/ROUTE 2A	Shared Street w/TC		4,821	72
MAPLE STREET/ROUTE 2A	LOWELL STREET/ROUTE 2A	MASSACHUSETTS AVENUE	Shared Street w/TC		5,162	72
MARRETT ROAD	ROUTE 2A	LINCOLN TOWN LINE/MINUTEMAN HS	Bike Lane		2,020	72
MERIAM STREET	MINUTEMAN BIKEWAY	MASSACHUSETTS AVENUE	Shared Lane & Bike Lane	MMBW - East to LHS	297	72
HANCOCK STREET	BEDFORD STREET/ROUTE 4	ADAMS STREET	Shared Street w/TC		2,434	71
MARRETT ROAD/ROUTE 2A	SPRING STREET	LINCOLN STREET	Bike Lane		3,454	71
LOWELL STREET	WOBURN STREET	EAST STREET	Bike Lane		3,567	69
MARRETT ROAD/ROUTE 2A	WALTHAM STREET	SPRING STREET	Bike Lane		1,985	68
MASSACHUSETTS AVE	I-95 BRIDGE	MARRETT ROAD/ROUTE 2A	Bike Lane		2,221	65
ROUTE 2A	MASSACHUSETTS AVENUE	LINCOLN TOWN LINE	Bike Lane		2,334	64
HARTWELL AVENUE	MINUTEMAN BIKEWAY	WOOD STREET	Separated BL	Hartwell Ave Corridor	3,654	63
BEDFORD STREET/ROUTE 4/225	MINUTEMAN BIKEWAY	ELDRED STREET	Separated BL		4,908	62
LOWELL STREET/ROUTE 2A	MAPLE STREET/WINCHESTER DRIVE	SUMMER STREET/ROUTE 2A	Bike Lane		3,499	62
WALTHAM STREET	PIPER ROAD	EXISTING BIKE LANES	Bike Lane		1,329	61
BEDFORD STREET/ROUTE 4/225	HARTWELL AVENUE	BEDFORD TOWN LINE	Bike Lane		1,528	60
MARRETT ROAD/ROUTE 2A	FORBES ROAD	MASSACHUSETTS AVENUE	Bike Lane		546	60
MARRETT ROAD/ROUTE 2A	LINCOLN STREET	WILSON ROAD	Bike Lane		1,193	60
LOWELL STREET	NORTH STREET	BURLINGTON TOWN LINE	Bike Lane		1,935	59
SUMMER STREET/ROUTE 2A	LOWELL STREET/ROUTE 2A	ARLINGTON TOWN LINE	Bike Lane		1,775	59
PLEASANT STREET	WORTHEN ROAD EAST	WATERTOWN STREET/ROUTE 4	Shared Street w/TC		1,595	58
WADSWORTH ROAD/SERVICE ROAD	WADSWORTH ROAD	WATERTOWN STREET	Bike Lane		1,323	58
ADAMS STREET	EAST STREET	NORTH STREET	Shared Street w/TC		2,963	57
CAMELLIA PLACE	BEDFORD STREET/ROUTE 4/225	MINUTEMAN BIKEWAY	Shared Street w/TC	MMBW - West to LHS	399	57
FLETCHER AVE	WOBURN STREET	HAYES LANE	Shared Street w/TC	MMBW - Vinebrook	1,533	57
MARRETT ROAD	ROUTE 2A	LINCOLN TOWN LINE	Bike Lane		1,495	57
PAUL REVERE ROAD	CEDAR STREET	MASSACHUSETTS AVENUE	Shared Street w/TC		2,847	57
BEDFORD STREET/ROUTE 4/225	HARTWELL AVENUE	ELDRED STREET	Separated BL		1,581	56
EAST STREET	BURNHAM ROAD	LOWELL STREET	Bike Lane		3,643	56
MASSACHUSETTS AVE/ROUTE 4/225	HOLLOW LANE	HUNT ROAD	Bike Lane		2,261	56
NORTH HANCOCK STREET	HAMILTON ROAD	BEDFORD STREET/ROUTE 4/225	Shared Street w/TC		2,222	56
HANCOCK STREET	REVERE STREET	BURLINGTON STREET	Shared Street w/TC		1,274	54
PLEASANT STREET	CONCORD AVENUE	LAWRENCE LANE	Shared Street w/TC		886	54
WALNUT STREET	CONCORD AVENUE	WALTHAM CITY LINE	Shared Street w/TC		2,606	54
LINCOLN STREET	LINCOLN TOWN LINE	MARRETT ROAD/ROUTE 2A	Shared Street w/TC		5,300	53
HAMILTON ROAD	LEDGELAWN AVENUE	HANCOCK STREET	Shared Street w/TC		542	52
SPRING STREET	CONCORD AVENUE	MARRETT ROAD	Bike Lane		5,684	52
FAIRFIELD DRIVE/BROOKWOOD ROA	LOWER VINE BROOK (NORTH)	LOWER VINE BROOK (SOUTH)	Shared Street w/TC		621	50
HANCOCK STREET	ADAMS STREET	REVERE STREET	Shared Street w/TC		1,589	50
HARTWELL AVENUE	WOOD STREET	BEDFORD TOWN LINE	Separated BL		1,672	49
LOWELL STREET	WOBURN STREET	WINCHESTER DRIVE	Bike Lane		1,882	49
NORTH STREET	ADAMS STREET	LOWELL STREET	Shared Street w/TC		1,694	49
NORTH STREET	BURLINGTON STREET	ADAMS STREET	Shared Street w/TC		3,973	49
PARK DRIVE	CLARKE STREET	WALTHAM STREET	Shared Street w/TC		1,538	49
WOBURN STREET	LOWELL STREET	WINCHESTER TOWN LINE	Bike Lane		2,051	49
REVERE STREET	BEDFORD STREET/ROUTE 4/225	HANCOCK STREET	Shared Street w/TC		2,010	48
BURLINGTON STREET	GROVE STREET	NORTH STREET	Shared Street w/TC		3,890	46
CONCORD AVENUE	SPRING STREET	BENJAMIN ROAD WEST	Bike Lane		1,818	46
LOWELL STREET	EAST STREET	NORTH STREET	Bike Lane		2,792	46
SPRING STREET	CONCORD AVENUE	WALTHAM CITY LINE	Bike Lane		627	46
WORTHEN ROAD	WALTHAM STREET	KENDALL ROAD	Bike Lane		1,384	45
ADAMS STREET	NORTH STREET	BURLINGTON TOWN LINE	Shared Street w/TC		517	44
WATERTOWN STREET	ROUTE 2 OFFRAMP	BELMONT TOWN LINE	Shared Street w/TC		691	43
WESTON STREET	LINCOLN STREET	SHADE STREET	Shared Street w/TC		294	43
HAYDEN AVENUE	SPRING STREET	200' EAST OF SPRING STREET	Bike Lane		195	41
HILL STREET	CEDAR STREET	BEDFORD STREET/ROUTE 4/225	Shared Street w/TC		3,873	41
WINTER STREET	JOHN BENSON ROAD	BEDFORD STREET/ROUTE 4/225	Shared Street w/TC		2,707	41
SKYVIEW ROAD	RANGEWAY STREET	JOHN BENSON ROAD	Shared Street w/TC		914	40
VOLUNTEER WAY	GROVE STREET	COACH ROAD	Shared Street w/TC		1,522	34
RANGEWAY STREET	VOLUNTEER WAY	SKYVIEW ROAD	Shared Street w/TC		195	32

Although they may not be the first group of projects to be implemented by the Town, the five highest scoring bicycle facility recommendations include:

- **Worthen Road** (from Mass Ave to Waltham St): the highest scoring of any project, (90 points) the recommendation would significantly improve bicycle connections to Lexington High School, the adjacent athletic fields, and the Lower Vine Brook path system. The corridor would include either a 10'-wide shared use path on the north/east side (replacing the existing 5'-wide sidewalk) or separated bike lanes could be striped on the roadway in both directions if parking were restricted to one side only.

Narrowing Concord Ave's travel lanes to 10'-11' and shifting the center line to the north accommodates a climbing bike lane in the eastbound direction.

- **Concord Avenue** (from Benjamin Rd West to the Belmont Line): while bike lanes in both directions can be striped west of Benjamin Rd West to Spring Street, to the east, the 28'-29'-wide roadway precludes bike lanes in both directions. As such, an uphill climbing bike lane is recommended with sharrows in the downhill direction. This creates an eastbound bike lane for most of Concord Ave. From Pleasant St to the Belmont Line however, when topography is reversed so the climbing bike lane would run westbound while sharrows should be striped on the downhill side.
- **Pleasant Street** (from Mass Ave to Watertown St): soon to be under construction, 5'-wide bike lanes along Pleasant St will extend from Mass Ave to the new roundabout at the Pleasant/ Watertown intersection. The bike lanes will link existing bike lanes on Mass Ave with the bike lanes on Watertown Street from Pleasant St over Route 2 to the Belmont Line.

- **Muzzey Street** (from Mass Ave to Park Drive): currently a one-way street with parking on the west side, the TBPP's recommendation is to remove parking and provide bi-directional separated bike lanes along the east side of the street. Combined with the highest scoring intersection improvement at Mass Ave and Depot Square, these projects are intended to remove the gap between the Minuteman Bikeway and LHS (and beyond, to Lincoln Park). The future redesign of LHS should incorporate this future connection into the site plan and placement of bike parking.
- **Waltham Street** (from Mass Ave to Worthen Rd): as a complement to the two-way bike facility on Muzzey St, a southbound bike lane is recommended on Waltham St to improve connectivity to LHS. To accommodate the bike lane, 10'-11' wide lanes should be striped along with shifting the centerline 1'-2' to the east.

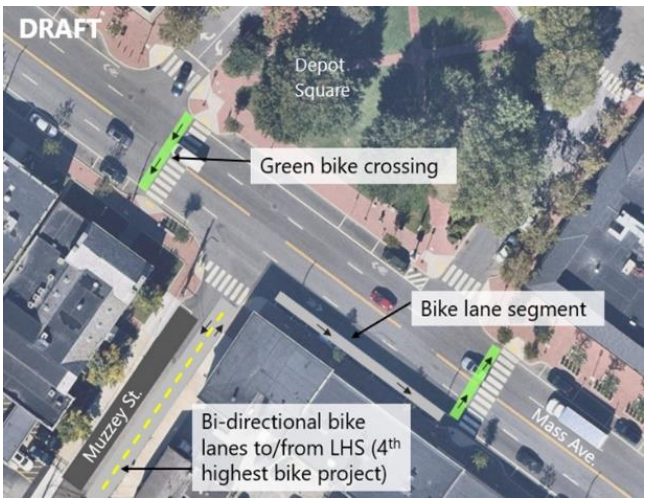
Bike Lanes in Lexington Center

It should be noted that several comments related to the desire for striped bike lanes on Mass Ave in Lexington Center were received during the planning effort. Given the proximity to LHS, the Town's primary pedestrian-oriented business district, and many cultural and historical destinations, improved access for bicyclists is logical for the Center. While not to preclude bike lanes in the long term, for the short/medium term the TBPP maintains Mass Ave in its current condition with shared lanes and relies on the nearby Minuteman Path and other recommended perpendicular bike facilities to provide bicycle access to Lexington Center.

Table 5 Intersection Recommendations

Facility Name	Street1	Street2	Project Recommendation	Theme	Project Score
Intersection Recommendations					
MASSACHUSETTS AVENUE	MASSACHUSETTS AVENUE	DEPOT SQUARE	Green bike crossing in coordination w Muzzey improvements	MMBW - east to LHS	73
BEDFORD STREET/ROUTE 4/225	BEDFORD STREET/ROUTE 4/225	HARRINGTON ROAD	New roundabout (under construction		70
BEDFORD STREET/ROUTE 4/225	BEDFORD STREET/ROUTE 4/225	WORTHEN ROAD	Reduce turning radius (NW corner)		65
HARTWELL AVENUE	HARTWELL AVENUE	MAGUIRE ROAD	add bike accommodations w green paint	Hartwell Ave Corridor	64
MARRETT ROAD/ROUTE 2A	MARRETT ROAD/ROUTE 2A	WALTHAM STREET	Reduce turning radii, add truck aprons		64
LOWELL STREET	LOWELL STREET	WOBURN STREET	Reduce turning radii, add truck aprons		63
WALTHAM STREET	WALTHAM STREET	BROOKSIDE AVENUE	Full reconstruction - close slip lane / add median island (per signal upgrades)		60
MASSACHUSETTS AVENUE/ROUTE 4/225	MASSACHUSETTS AVENUE/ROUTE 4/225	MAPLE STREET/ROUTE 2A	SLM in left turn approach on Mass Ave (EB and WB to Marrett Rd)		59
MASSACHUSETTS AVENUE/ROUTE 4/225	MASSACHUSETTS AVENUE/ROUTE 4/225	WOBURN ST/FLETCHER AVE/WINTHROP RD	Full reconstruction (close slip lanes)		58
MARRETT ROAD/ROUTE 2A	MARRETT ROAD/ROUTE 2A	SPRING STREET	Reduce turning radii, add truck aprons		57
HANCOCK STREET	HANCOCK STREET	COOLIDGE AVENUE	Reduce turning radius (SW corner)		56
CONCORD AVENUE	CONCORD AVENUE	WALTHAM STREET	Reduce turning radii, add truck aprons		55
MARRETT ROAD/ROUTE 2A	MARRETT ROAD/ROUTE 2A	SCHOOL STREET	Full reconstruction (T up intersection)		53
WALTHAM STREET	WALTHAM STREET	ROUTE 2 EB ON-RAMP (NB WALTHAM ST)	Reduce turning radius or add raised x-walk		53
CONCORD AVENUE	CONCORD AVENUE	WALNUT STREET	Reduce turning radii & extend median island		52
PHILIP ROAD	PHILIP ROAD	WORTHEN ROAD E	Reduce turning radius		52
BEDFORD STREET/ROUTE 4/225	BEDFORD STREET/ROUTE 4/225	HARTWELL AVENUE	Full reconstruction (address slip lanes)		51
LOWELL STREET	LOWELL STREET	EAST STREET	Enlarge existing splitter island		51
PLEASANT STREET	PLEASANT STREET	STEARNS ROAD	reduce radius NW corner and expand concrete landing		51
ADAMS STREET	ADAMS STREET	EAST STREET	Full reconstruction (T up intersection)		50
LOWELL STREET/ROUTE 2A	LOWELL STREET/ROUTE 2A	SUMMER STREET/ROUTE 2A	Full reconstruction (T up intersection)		50
MASSACHUSETTS AVENUE	MASSACHUSETTS AVENUE	SCHOOL STREET	Reduce turning radius (SE corner)		50
PLEASANT STREET	PLEASANT STREET	WATERTOWN STREET	Roundabout currently in design and funded		50
ANTHONY ROAD	ANTHONY ROAD	LILLIAN ROAD	Reduce turning radii		49
LOWELL STREET	LOWELL STREET	LACONIA STREET	Reduce turning radius (NW corner)		49
MASSACHUSETTS AVENUE	MASSACHUSETTS AVENUE	BEDFORD STREET/ROUTE 4/225	Full reconstruction (T up intersection)		49
FOLLEN ROAD	FOLLEN ROAD	LOCUST AVE	Reduce turning radius (NW corner)		48
WORTHEN ROAD EAST	WORTHEN ROAD EAST	PLEASANT STREET	Add bump out (NE corner)		48
MASSACHUSETTS AVENUE	MASSACHUSETTS AVENUE	HARRINGTON ROAD	Full reconstruction (T up intersection/close slip lane)		47
HANCOCK STREET	HANCOCK STREET	ADAMS STREET	Full reconstruction (T up intersection)		45
KENDALL ROAD	KENDALL ROAD	FARMCREST AVENUE	Bump out (SW corner)		45
LOWELL STREET	LOWELL STREET	MAPLE STREET/WINCHESTER DRIVE	Full reconstruction (close slip lanes)		44
CEDAR STREET	CEDAR STREET	PAUL REVERE ROAD/HILL STREET	Full reconstruction (T intersections / close slip lanes)		43
MERIAM STREET	MERIAM STREET	SOMERSET ROAD/FRANKLIN ROAD	Small traffic circle (mountable)		40

Although they may not be the first group of intersection improvements to be implemented by the Town, the five highest scoring intersection recommendations include:



A mix of bike lanes and green bicycle crossings on Mass Ave at Depot Square will improve the linkage from the Minuteman Bikeway to LHS.

- **Mass Ave at Depot Square:** the intent of this improvement is to better facilitate safe bicycle access from the Minuteman Bikeway to Lexington High School and vice versa. The feature enhancements include striped bicycle crossings with green pavement markings immediately adjacent to the pair of Mass Ave crosswalks at Depot Square. Crossings would be direction with southbound bicyclists using the west crosswalk and northbound bicyclists using the east crosswalk. The latter requires a short bike lane from Muzzey Street to the crosswalk for access. This recommendation is paired with the bi-directional bikes along Muzzey Street described above.
- **Bedford Street at Harrington Road:** currently under construction, this challenging intersection for bicyclists and pedestrians will soon feature a modern roundabout. The design includes a geometry that slows motor vehicle traffic significantly, crosswalks with landscaped splitter islands, and shared lanes for bicyclists.
- **Bedford Street at Worthen Road:** improvements at the intersection focus on the northwest corner. A tighter curb radius with truck-turning apron is recommended to slow traffic and improve safety for pedestrians and thru-bicyclists traveling on Bedford Street. A striped bike lane should also be striped along the north side of Worthen Road from the intersection to remove the gap with the existing bike lane that starts nearly 400 feet to the west.
- **Hartwell Ave at Maguire Road:** currently, the intersection features right turn slip lanes that accommodate very high speeds and no pedestrian infrastructure. Although a bike lane is present, the high-speed traffic from Maguire to Bedford Road creates a significant safety issue for southbound bicyclists. In the near-term bike lanes should be painted green. For the future redesign, slip lanes should be removed, buffered or separated bike lanes added (with green pavement markings, as needed), and crossing opportunities for pedestrians.
- **Marrett Road at Waltham Street:** as part of State Route 2A, improvements will require coordination and approval by MassDOT. Recommendations include the reduction of the corner curb radii (with truck-turning aprons) to slow traffic and improve pedestrian safety. Potential future bicycle lanes recommended along both roadways will need to be accommodated as well.

4.4 Prioritized Table of Pedestrian Recommendations

Similar to the bicycle facility projects, projects, recommendations intended to improve safety and connectivity for people walking and using wheelchairs included recommendations for new or improved sidewalks, crosswalks, and pedestrian safety countermeasures that should be considered at many crosswalk locations. The Prioritization tables on the following pages indicate the roadway location, the project recommendation, project "theme" (i.e., whether it provides connections along a longer corridor), the specific recommendation, project length, and evaluation score. Recommendations highlighted in yellow indicate those that lie along MassDOT roadways.

Table 6 Sidewalk Recommendations

Facility Name	Street1	Street2	Project Recommen-dation	Theme	Length (feet)	Project Score
Sidewalk Recommendations						
WALTHAM STREET	MARRETT ROAD/ROUTE 2A	WORTHEN ROAD	New		1,922	72
MARRETT ROAD/ROUTE 2A	KENDALL ROAD	MASSACHUSETTS AVENUE/ROUTE 4/225	Improvement		5,299	71
MARRETT ROAD/ROUTE 2A	MIDDLE STREET	SPRING STREET	Improvement		1,733	69
BASKIN ROAD	BASKIN ROAD	WORTHEN ROAD	New		654	67
WORTHEN ROAD	MASSACHUSETTS AVENUE	BEDFORD STREET/ROUTE 4/225	Improvement		1,834	67
MARRETT ROAD/ROUTE 2A	WALTHAM STREET	KENDALL ROAD	New		1,022	65
MARRETT ROAD/ROUTE 2A	WALTHAM STREET	SPRING STREET	Improvement		1,966	64
BEDFORD STREET/ROUTE 4/225	WORTHEN ROAD	TEWKSBURY STREET	Improvement		820	59
MASSACHUSETTS AVENUE	PERCY ROAD/TAVERN LANE	EXISTING S/W 100' EAST OF HOLLOW LAI	New		529	59
MARRETT ROAD/ROUTE 2A	LINCOLN STREET	MIDDLE STREET/CARY AVENUE	Improvement		1,713	57
LOWELL STREET	LACONIA STREET	EAST STREET	New		796	56
MERIAM STREET	YORK STREET	ADAMS STREET	New		1,464	56
STEDMAN ROAD	ALLEN STREET	CLARKE MIDDLE SCHOOL	New		498	56
BURLINGTON STREET	GROVE STREET	NORTH STREET	New		3,885	55
HARTWELL AVENUE	MAGUIRE ROAD	WOOD STREET	New		3,580	55
ADAMS STREET	EAST STREET/HATHAWAY RoaD	NORTH STREET	Improvement		3,456	54
CROSBY ROAD	MASSACHUSETTS AVENUE	HASTINGS SCHOOL DRIVEWAY	New		386	54
WALNUT STREET	CONCORD AVENUE	CART PATH LANE	New		1,854	53
FLETCHER AVE	WOBURN STREET	HAYES LANE	New	MMBW Vinebrook	1,529	53
SPRING STREET	SHADE STREET	WALTHAM CITY LINE	Improvement		3,410	53
BURLINGTON STREET	SIMONDS ROAD	BLAKE ROAD	New		1,654	51
BURLINGTON STREET	EXISTING SIDEWALK	GROVE STREET	New		135	50
CAMELLIA PLACE	EXISTING SIDEWALK	MINUTEMAN BIKEWAY	New	MMBW LHS West c	243	50
FOLLEN ROAD	MARRETT ROAD/ROUTE 2A	SMITH AVENUE/SUMMIT ROAD	New		3,390	50
RINDGE AVENUE	WINN AVENUE	EXISTING SIDEWALK	New		753	50
PLEASANT STREET	DOVER LANE	200' EAST OF DOVER LANE	Improvement		209	49
KENDALL ROAD	EXISTING SIDEWALK	MARRETT ROAD/ROUTE 2A	New		440	48
LILLIAN ROAD	SHEILA ROAD	LOWELL STREET	New		1,788	48
SEDGE ROAD	EXISTING SW 250' WEST OF HATHAWAY ROAD	EXISTING SW 400' SOUTH OF DIAMOND S	New		367	48
BEDFORD STREET/ROUTE 4/225	ELDRED STREET	EXISTING SW 220' NORTH OF CIDER MILL	New		2,507	47
BEDFORD STREET/ROUTE 4/225	EXISTING SW 200' EAST OF HARTWELL AVENUE	EXISTING SW 250' WEST OF ELDRED STRE	New		961	47
LINCOLN STREET	MARRETT ROAD/ROUTE 2A	MIDDLEBY ROAD	Improvement		1,560	47
BEDFORD STREET/ROUTE 4/225	HARTWELL AVENUE	BEDFORD TOWN LINE	New		1,437	46
EASTERN AVENUE	SCHOOL STREET	EWELL AVENUE	New		161	46
HARTWELL AVENUE	WOOD STREET	HAFB ENTRY GATE	New	Hartwell Ave Corrid	740	46
LOCUST AVENUE	EXISTING S/W 150' EAST OF FOLLEN ROAD	END OF S/W AT 43 LOCUST AVENUE	Improvement		116	46
PEACOCK FARM ROAD	WATERTOWN STREET/ROUTE 4	BUTLER AVENUE	New		3,528	46
ALBEMARLE AVENUE	ANTHONY ROAD	HILLCREST AVENUE/RAWSON AVENUE	New		122	45
ANTHONY ROAD	LILLIAN ROAD	ALBEMARLE AVENUE	New		328	45
BLOSSOMCREST ROAD	WALTHAM STREET	ALLEN STREET	Improvement	ACROSS	1,851	45
GRASSLAND STREET	SPRING STREET	VALLEYFIELD STREET	Improvement		1,723	45
LOCUST AVENUE	EXISTING SIDEWALK	MASSACHUSETTS AVENUE/ROUTE 4/225	New		1,306	45
SCHOOL STREET	EASTERN AVENUE	MARRETT ROAD/ROUTE 2A	New		1,511	45
TAFT AVENUE	EXISTING SIDEWALK EAST OF CHARLES STREET	EXISTING SIDEWALK EAST OF SUTHERLAN	New		400	45
WOOD STREET	CONESTOGA ROAD	CHESTNUT LANE	New		187	45
GRANT STREET	EAST STREET	COLONY ROAD	New		1,114	44
KENDALL ROAD	WALTHAM STREET	EXISTING SIDEWALK	New		250	44
NORTH STREET	LOWELL STREET	BURLINGTON TOWN LINE	New		867	44
NORTH STREET	BURLINGTON STREET	ADAMS STREET	New		3,977	44
WOODLAND ROAD	HAYES AVENUE	ADAMS STREET	New		899	44
CEDAR STREET	HILL STREET	MASSACHUSETTS AVENUE	New		1,190	43
SMITH AVENUE	EXISTING S/W 100'NORTH OF FOLLEN ROAD	FOLLEN ROAD	New		140	43
SMITH AVENUE	EXISTING S/W 200' SOUTH OF INDEPENDENCE A	EXISTING S/W 200'NORTH OF FOLLEN RO	New		291	43
TOWER ROAD	EXISTING SIDEWALK	MASSACHUSETTS AVENUE/ROUTE 2A/4/	New		181	43
WINTER STREET	JOHN BENSON ROAD	BEDFORD STREET/ROUTE 4/225	New	ACROSS	2,650	43
WOOD STREET	FAIRVIEW AVENUE	50' SOUTH OF FAIRVIEW AVENUE	New		60	43
WOOD STREET	WOODPARK CIRCLE	100' SOUTH OF WOODPARK CIRCLE	New		66	43
BLOSSOMCREST ROAD	ALLEN STREET	MEADOW BROOK AVENUE	New	ACROSS	1,422	42
HAMILTON ROAD	HANCOCK STREET	LEDGELAWN AVENUE	New		544	42
LOCUST AVENUE	EXISTING SIDEWALK	EXISTING S/W 150' EAST OF LEXINGTON A	New		229	42
LOCUST AVENUE	FOLLEN ROAD	EXISTING S/W 150' EAST OF FOLLEN ROA	New		161	42
MAGUIRE ROAD	HARTWELL AVENUE	BEDFORD TOWN LINE	New		1,684	42
MASSACHUSETTS AVENUE	WOOD STREET	MARRETT ROAD/ROUTE 2A	New		1,818	42
MERIAM STREET	SOMERSET ROAD/ABBOTT ROAD	YORK STREET	New		1,079	42
RINDGE AVENUE	EXISTING S/W 75'NORTH OF WINN AVENUE	EXISTING S/W 125'NORTH OF WINN AVE	New		51	42
SKYVIEW ROAD	RANGEWAY STREET	JOHN BENSON ROAD	New		856	42

Facility Name	Street1	Street2	Project Recommen-dation	Theme	Length (feet)	Project Score
Sidewalk Recommendations						
WILSON ROAD	ROOSEVELT ROAD	MARRETT ROAD/ROUTE 2A	New		662	42
BAKER AVENUE	EXISTING SIDEWALK	TAFT AVENUE	New		159	41
BAKER AVENUE	BUTLER AVENUE	EXISTING SIDEWALK	New		767	41
CEDAR STREET	ENTRANCE TO PINE MEADOWS GOLF CLUB	HILL STREET	New		2,936	41
GARFIELD STREET	EARL STREET	REED STREET	New		721	41
HAYES AVENUE	BERWICK ROAD	HANCOCK STREET	New		642	41
REED STREET	AUGUSTUS ROAD	CENTRE STREET	New		2,136	41
WATERTOWN STREET/ROUTE 4	CRESCENT ROAD	PLEASANT STREET	New		890	41
BALFOUR STREET	ASBURY STREET	CEDAR STREET	New		1,016	40
HAYES LANE	FLETCHER AVE	GRANT STREET	New	MMBW - Vinebrook	263	40
HOMESTEAD STREET	CEDAR STREET	ASBURY STREET	New		1,115	40
RAWSON AVENUE	ALBEMARLE AVENUE	RINDGE AVENUE	New		376	40
HAYES AVENUE	CASTLE ROAD	WOODLAND ROAD	New		651	39
NORTH STREET	ADAMS STREET	LOWELL STREET	New		1,671	39
BERWICK ROAD	HAYES AVENUE	EXISTING S/W 300' NORTH OF HAYES AV	New		224	38
RANGEWAY STREET	VOLUNTEER WAY	SKYVIEW ROAD	New		185	38
RICHARD ROAD	FOLLEN ROAD	EXISTING S/W 150' EAST OF ROBBINS RO	New		1,042	38
SOMERSET ROAD	FRANKLIN ROAD	HAYES AVENUE	New		440	38
ASBURY STREET	HOMESTEAD STREET	PAUL REVERE ROAD	New		1,287	37
GROVE STREET	VOLUNTEER WAY	BEDFORD TOWN LINE	New		882	37
LINCOLN STREET	LINCOLN TOWN LINE	WESTON STREET	New	ACROSS	2,633	37
SOMERSET ROAD	EXISTING S/W 200' WEST OF FRANKLIN ROAD	FRANKLIN ROAD	New		207	36
VOLUNTEER WAY	GROVE STREET	RANGEWAY STREET	New		1,545	36
CASTLE ROAD	FRANKLIN ROAD	HAYES AVENUE	New		490	35
FARMCREST AVE	EXISTING SIDEWALK	KENDALL ROAD	New		120	35
FRANKLIN ROAD	SOMERSET ROAD	CASTLE ROAD/FRANKLIN ROAD	New		285	32

Although they may not be the first group of new and improved sidewalks to be implemented by the Town, the five highest scoring sidewalk recommendations include:

- **Waltham Street** (from Marrett Rd to Worthen Rd): the intent of the new sidewalk recommendation is to provide a safe space for walking or using a wheelchair on the east side of Waltham St. A sidewalk lies on the west side of the corridor but the speed of traffic and the poor sight lines make it difficult for residents to access.
- **Marrett Road** (from Kendall Rd to Mass Ave): currently, the existing south sidewalk is in poor condition and less than 4'-wide in places. Lying along State Route 2A, coordination with MassDOT is required.

Segment of Marrett Road's south sidewalk near Bacon St in need of repair.

- **Marrett Road** (from Middle St to Spring St): similar to the more easternmost segment described above, the existing south sidewalk is in poor condition and is less than 4'-wide in places. Lying along State Route 2A, coordination with MassDOT is required before repairs are made.
- **Baskin Road** (Baskin Rd to Worthen Rd): Baskin Road provides a key connection for pedestrians and bicyclists wishing to access LHS and points beyond. This new sidewalk recommendation would fill in the gap between the existing sidewalk further up the hill and Worthen Road.
- **Worthen Road** (from Mass Ave to Bedford St): the plan recommends enhanced clearing of the dense vegetation along the south/east sidewalk around the curve on the approach to Mass Ave to ensure a fully accessible five-foot width is maintained.

Table 7 Crosswalk Recommendations

Facility Name	Cross Street 1	Cross Street 2	Project Recommendation		Theme	Project Score
Crosswalk Recommendations						
Hancock Street	Hancock Street	Minuteman Commuter Bikeway	Improve	RRFB		69
Massachusetts Avenue	Massachusetts Avenue	Bowker Street	Improve	Bump outs	Mass Ave East	65
Marrett Road/Route 2A	Marrett Road/Route 2A	Kendall Road	New	Piano Key, ramp & RRFB		63
Massachusetts Avenue	Massachusetts Avenue	Charles Street	Improve	Bump outs and RRFB	Mass Ave East	63
Lowell Street	Lowell Street	Harrington Elementary Driveway	Improve	Median island & RRFB		62
Lowell Street/Route 2A	Lowell Street/Route 2A	Whipple Road	New	Piano Key and ramp	ACROSS LEX	60
Massachusetts Avenue	Massachusetts Avenue	Crosby Road	Improve	RRFB		60
Lincoln Street	Lincoln Street	Middlby Road	New	Piano Key & ramp (by developer)	ACROSS LEX	59
Massachusetts Avenue	Massachusetts Avenue	Fottler Avenue	Improve	Bump outs and RRFB	Mass Ave East	59
Massachusetts Avenue/Route 4/225	Massachusetts Avenue/Route 4/225	Winthrop Road/Woburn Street	New	Coordinate w new intersection		58
Massachusetts Avenue	Massachusetts Avenue	Bow Street	Improve	Bump outs and RRFB	Mass Ave East	57
Massachusetts Avenue	Massachusetts Avenue	Hastings Road	Improve	RRFB		57
Revere Street	Revere Street	Minuteman Commuter Bikeway	Improve	RRFB		57
School Street	School Street	Rolling Avenue	New	Piano Key striping & ramp		57
Crosby Road	Crosby Road	Hastings School Driveway	New	Piano Key w/ RRFB		56
Grant Street	Grant Street	Sherman Street	Improve	RRFB		56
Marrett Road/Route 2A	Marrett Road/Route 2A	Bacon Street	Improve	Piano Key & RRFB		56
Marrett Road/Route 2A	Marrett Road/Route 2A	Massachusetts Ave (West)	New	Piano Key striping		56
Maple Street/Route 2A	Maple Street/Route 2A	Solomon Pierce Road	Improve	Piano key striping		55
Marrett Road/Route 2A	Marrett Road/Route 2A	Stedman Road	Improve	Piano Key & RRFB		55
Marrett Road/Route 2A	Marrett Road/Route 2A	Battle Road Trail	New	Piano Key striping		55
Massachusetts Avenue	Massachusetts Avenue	Sylvia Street	Improve	Median island	Mass Ave East	55
Woburn Street	Woburn Street	Solomon Pierce Road	Improve	RRFB		55
Massachusetts Avenue	Massachusetts Avenue	Estabrook Road	New	RRFB		55
Worthen Road	Worthen Road	Lincoln Park Trail	Improve	Bump outs (per SBL/path design)		54
Bedford Street/Route 4/225	Bedford Street/Route 4/225	Valley Road/North Hancock Street	Improve	Piano Key w/ RRFB		53
Lowell Street	Lowell Street	Fulton Road	Improve	RRFB		53
Massachusetts Avenue	Massachusetts Avenue	Oak Street	Improve	Bump out (ONE side only)	Mass Ave East	53
Pleasant Street	Pleasant Street	Between Worthen Road East - Rt 2 On-F	Improve	Bump outs (reduce lanes to 11')		53
Burlington Street	Burlington Street	Blake Road	Improve	RRFB		52
Hartwell Avenue	Hartwell Avenue	Wood Street	New	Piano Key & RRFB	Hartwell Ave Corrido	52
Lowell Street/Route 2A	Lowell Street/Route 2A	Fairlawn Avenue	Improve	Piano Key & RRFB		52
Massachusetts Ave (West)	Massachusetts Ave (West)	Marrett Road/Route 2A	New	Piano Key striping		52
Summer Street/Route 2A	Summer Street/Route 2A	Whipple Hill Trail	New	Piano Key, ramp & RRFB		52
Marrett Road/Route 2A	Marrett Road/Route 2A	Prospect Hill Road	New	Piano Key & RRFB		51
Marrett Road/Route 2A	Marrett Road/Route 2A	Old Reservoir Parking	Improve	Piano Key striping		51
Watertown Street/Route 4/225	Watertown Street/Route 4/225	Crescent Road	Improve	RRFB		51
Woburn Street	Woburn Street	Manley Court	New	Piano Key, ramp & RRFB		51
Lowell Street	Lowell Street	Locke Village Driveway	New	Piano Key & RRFB		51
Pleasant Street/Route 4	Pleasant Street/Route 4	Wilson Farm Parking Lot	Improve	RRFB		49
Concord Avenue	Concord Avenue	Path at Scott Road	New	Piano Key w/ RRFB	ACROSS LEX	48
East Street	East Street	Emerson Road	Improve	Bump out on NW corner		48
Burlington Street	Burlington Street	Simonds Road	Improve	RRFB		47
Pleasant Street/Route 4	Pleasant Street/Route 4	Mason Street	Improve	RRFB		47
Spring Street	Spring Street	Woodcliffe Road	New	Piano Key w/ RRFB		47
Wood Street	Wood Street	Battle Road Trail/Old Massachusetts Av	Improve	RRFB and ADA landing		46
Baskin Road	Baskin Road	Baskin Road	New	Piano Key and ramp		45
Conestoga Road	Conestoga Road	Wood Street	New	Piano Key and RRFB		45
Minuteman Commuter Bikeway	Minuteman Commuter Bikeway	Seasons Four Driveway	Improve	Private land; wider Piano Key striping and improve site lines		45
Watertown Street/Route 4/225	Watertown Street/Route 4/225	Pleasant Street	New	Crosswalks per toundabout design		45
Wood Street	Wood Street	Conestoga Road	New	Piano Key & RRFB		45
Wood Street	Wood Street	Woodpark Circle	New	Piano Key & RRFB (by developer)		45
Wood Street	Wood Street	Fairview Avenue	New	Piano Key and RRFB		45
Hathaway Road	Sedge Road	Hathaway Road	New	Piano Key & bump out		44
Simonds Road	Simonds Road	Blake Road	New	Piano Key striping & ramp	ACROSS LEX	43
Grove Street	Grove Street	Gould Road	Improve	tighten corners to slow right turn		42
Maple Street	Maple Street	114/120 Maple Street	New	only if trail is built	ACROSS LEX	42
Wood Street	Wood Street	Massachusetts Avenue	New	Piano Key & truck apron		42
Burlington Street	Burlington Street	Longfellow Road	New	Piano Key striping	ACROSS LEX	41
Grove Street	Grove Street	Tidd Circle	New	Piano Key and ramp	ACROSS LEX	41
Maple Street	Maple Street/Route 2A	Lowell Street	New	Two Piano key & ramps		41

Although they may not be the first group of new and improved crosswalks to be implemented by the Town, the five highest scoring crosswalk recommendations include:

View of crosswalk on Mass Ave at Bowker Street facing east (additionally, bike lanes along Mass Ave are recommended)

- **Hancock Street at the Minuteman Bikeway crossing:** installation of RRFBs is recommended to improve the current crossing conditions for pedestrians and bicyclists.
- **Mass Ave at Bowker Street:** to reduce the length of the 50-foot-long crosswalk and to enhance visibility of pedestrians, the plan recommends installation of curb extensions/bump outs on each side of the roadway.
- **Marrett Road at Kendall Road:** this proposed new crosswalk and RRFBs would help to link the neighborhoods on each side of Marrett Road. The crossing would lie more than 500 feet from the crosswalk to the baseball fields to the east and over 900 feet from the Waltham St intersection.
- **Mass Ave at Charles Street:** the addition of curb extensions/bump outs—along with RRFBs—on Mass Ave is intended to reduce the length of the 50-foot-long crosswalk and to enhance visibility of pedestrians, especially those trying to cross at night.
- **Lowell Street at the Harrington School driveway:** the plan recommends improving safety for school children and parents at the existing crosswalk. Safety counter measures should include RRFBs and a raised median island that would shadow the left-turn pocket on the northbound approach to the school driveway.

Mass Ave Crosswalk at the Post Office

It should be noted that the planning team considered a median island and other pedestrian safety counter-measures at the crosswalk in front of the Post Office. Due to potential conflicts a median island would create for parades along Mass Ave and the change RRFBs would bring to the surrounding historic character of Lexington Center, no changes to the crossing have been recommended at this time.

4.5 Prioritized Table of Trail Recommendations

Using the prioritization methodology described earlier in this chapter, scores were given to all infrastructure project recommendations found in the Lexington Town-wide Bicycle and Pedestrian

Plan. Recommendations for new and enhanced trails and shared use paths intended to improve connectivity for both bicyclists and pedestrians are included. The Prioritization table on the following page indicates the location, the project recommendation, project "theme" (i.e., whether it provides connections along a longer corridor), project length, and evaluation score.

Table 8 Trail/Shared Use Path Recommendations

Facility Name	Street1	Street2	Theme	Project Recommen-dation	Length (feet)	Project Score
Trail/Shared Use Path Recommendations						
Grove Street	Estabrook School driveway	Volunteer Way		New Sidepath	3,887	64
Hartwell Avenue	Bedford Street/Route 4	Maguire Road	Hartwell Ave Corridor	New Sidepath	2,813	63
Clarke Middle School Fields Path	Stedman Road	Marrett Road/Route 2A		New Path	1,088	61
Hayden Woods Path	Valleyfield Street	Waltham Street/Brookside Avenue		Trail Improvement	933	58
Paint Mine Trails	400' West of Turning Mill Road	500' East of Grove Street	ACROSS LEX	Trail Improvement	1,806	58
New Path	Lincoln Street	Lincoln Park Path		New Path	1,048	57
New Path	Marrett Road/Route 2A/Bacon Street	Lexington Community Center		New Path	1,758	57
Unnamed Trail	Woodland Road	Fiske Elementary School		Trail Improvement	626	56
Dunback Meadow Trail Improvement	400' South of Bacon Street	Clarke Middle School		Trail Improvement	1,375	56
Bacon Street Path Improvement	Marrett Road/Route 2A	400' south of Bacon Street		Trail Improvement	1,940	55
Dunback Meadow Path	Worthen Rd E	Back of Bowman Elementary School		Trail Improvement	550	54
New Path	Hathaway Road	Brent Road		New Path	735	54
Wood Street	Massachusetts Avenue	Hartwell Avenue		New Sidepath	6,865	54
New Path	Lowell Street	Locke Village to Cycle Loft		New Path	170	54
Eldred Street	Bedford Street/Route 4	Grove Street		New Sidepath	2,405	53
Marrett Road/Route 2A	Forbes Road	Wilson Road		New Sidepath	2,292	51
New Path	Baseball Field/Clarke Street	Lexington High School		New Path	563	51
Lower Vine Brook Path	East Street/Emerson Road	Lower Vine Brook Path End		Trail Improvement	1,088	50
Paint Mine Trails	Turning Mill Road	Burlington Town Line	ACROSS LEX	Trail Improvement	1,250	50
Emerson Road	East Street	400' West of Thoreau Road		New Sidepath	851	48
New Path	Countryside Village	Harrington Elementary School		New Path	866	47
Simonds Brook Trail	700' east of Bedford Street	500' east of Grove Street		Trail Improvement	3,245	47
Lower Vine Brook Path	Brookwood Road	Fairfield Drive		Trail Improvement	538	46
North Street	North Street Path End	Adams Street		New Sidepath	84	45
Adams Street	North Street	Burlington Town Line		New Sidepath	506	43
New Path	Grove Street/Volunteer Way	Wright Farm Trails		New Path	247	43
New Path	Minuteman Commuter Bikeway	Ledgelawn Avenue		New Path	377	43
Western Greenway	Path End	Walnut Street		Trail Improvement	1,680	43
Connector Path	Garfield Street	Minuteman Commuter Bikeway		Trail Improvement	235	41
New Path	Concord Avenue	Path End	ACROSS LEX	New Path	1,591	41
New Path	Ellen Dana Court	Minuteman Commuter Bikeway		New Path	607	41
New Path	Rindge Ave	Arlington Reservoir Trail		New Path	357	41
New Path	Bedford Street/Route 4	Simonds Brook Trail		New Path	718	41
New Path	Cutler Farm Road/Hudson Road	Valleyfield Street		New Path	544	41
New Path	Valley Road	Minuteman Commuter Bikeway		New Path	140	39
New Path	Pleasant Street	Watertown Street	ACROSS LEX	New Path	3,237	37

Although they may not be the first group of new and improved trails and shared use paths to be implemented by the Conservation Commission or other Town departments, the five highest scoring trail/shared use path recommendations include:

- **Grove Street Sidepath** (from Estabrook School driveway/Eldred St to Volunteer Way within public ROW): the recommended expansion of the existing 5'-wide west sidewalk to 8'-10' for pedestrian and bicycle traffic will improve connectivity to the Estabrook School. Care will need to be taken with the segment south of Eldred St where the ROW narrows and space may not be available for an 8'-10'-wide sidepath.
- **Hartwell Avenue Sidepath** (from Bedford St/Rt. 4 to Maguire Road within public ROW): the TBPP recommends further enhancement of the current south sidewalk along Hartwell

Avenue to meet standards for a fully accessible shared use path. This could include the need to widen the path is places and special crossing treatment at the driveway locations. This segment of sidepath is part of the design work currently in progress and intended to be constructed in 2030 using federal funds.

- **Clarke Middle School Fields Path** (from Marrett Rd to Stedman Rd on Recreation Dept. property): this recommended path accommodates a significant desire line between the Marrett Rd crosswalk and the Clarke Middle School via a route just west of the ball fields. The path would pass very close to the baseball back-stop, run alongside the soccer pitch and pass between the south baseball diamond and the tennis courts. The future path would provide a more intuitive and accessible route compared with the adjacent, hilly "paper street" between Marrett Rd and Brookside Ave.

South-facing view of the potential new path corridor (at middle-right) connecting Marrett Road with the Clarke Middle School.

- **Hayden Woods Path** (from Valleyfield St to Waltham St/Brookside Ave on Conservation Commission property): while this "paper street" currently contains a dirt/gravel footpath, the TBPP recommends upgrades to an 8'-10'-wide stonedust path that is fully accessible for all. This will enhance connectivity from the neighborhoods west of Waltham St to the Clarke Middle School. Coordination with the Conservation Commission will be required before moving forward with implementation of the improvements.
- **Paint Mine Trails** (from ~400' west of Turning Mill Rd to Grove St on Conservation Commission property): this recommendation would likely include a shared-use path along the utility easement that runs between the Burlington Landlocked Forest trailhead on Turning Mill Rd and Grove St. Coordination with the Conservation Commission and Eversource and other utility companies will be required before moving forward with implementation of the improvements.

5

Implementation Strategy

The recommendations developed for the Town-wide Bicycle and Pedestrian Plan represent a major investment in active transportation infrastructure in Lexington. The short, medium, and long-term results could have a substantial impact on bicycle and pedestrian accessibility and safety and improve the quality of life for those who live, work, or visit the town. None of this can happen without a strong implementation strategy that includes identification of high-level costs, performance measures, and those who will take the lead on implementing project recommendations. Since many of the recommendations sit along state roadways, MassDOT will be a critical player to help improve bicycling, walking, rolling, and using micromobility in Lexington.

5.1 Table of Prioritized Projects

The Table of prioritized projects is presented in Appendix D

5.2 Performance Measures

Performance Measures are data-driven benchmarks intended to help the Town of Lexington gauge progress towards the Town-wide Bicycle and Pedestrian Plan's five goals. They also help the Town departments and committees communicate successes and challenges and motivate community and political leaders to take further action to help implement the TBPP through funding and/or public support. By nature, they are aspirational and intended to 'push the envelope' to encourage moving ahead in a somewhat aggressive nature to improve safety and accessibility for pedestrians, bicyclists, and micromobility users in Lexington. To achieve success, serious consideration of additional funding for implementation and maintenance will be needed. This will affect the five-year Capital Plans for a handful of departments, especially the Public Works Department.

To better track our performance and help adjust our implantation, collecting data on how safe bicyclists and pedestrians feel, changes to the number of students walking or biking to school and tracking near misses will provide meaningful measures. However, this data is not readily available and will need to be collected via surveys.

Table 9 Performance Measures[26]

Plan Goals	Performance Measure	3-and-8 Year Targets		Lead Agencies/ Groups
		2027	2032	
1: SAFETY	Reduction in bicycle and pedestrian-involved crashes. *This metric does not account for how safe people feel	25%	50%	Planning Department, Police and TSG.
	Number of crosswalks enhanced with pedestrian safety countermeasures (new or existing)	6	16	Public Works, Planning Department, and TAC
	Reduction of reports of nears misses (This data set can be created through online mapping. Will need to develop baseline)	25%	50%	TSG/Police
2: CONNECTIVITY	Number of lane miles of new bike lanes (either standard or separated)	4 mi.	20 mi.	Public Works, Planning Department and TAC / LBAC
	Total miles of connected bike lanes increasing	2	10	Engineering, DPW, TSG
	Number of new bicycle or pedestrian safety projects (of any type) within ½ mile of a public or private K-12 school	6	24	Public Works, Planning Department, and Lex. Public Schools
	Number of new sidewalk projects that eliminate gaps in the network	10%	50%	Engineering, DPW, TSG , Commission on Disability
3: DESIGN	Number of lane miles of new separated bike lanes and/or new side paths	1 mi.	6 mi.	Public Works, Planning Department, TAC / LBAC
4: ECONOMY	Increased percentage of commuters who report walking or bicycling to work as their primary means of transportation (per current ACS data, 2.2% and 1.2%, respectively)	2.5% walk 2% bike	3% walk 3% bike	Planning Department and Economic Development
	The number of Lexington students riding buses to school. Currently 50% of the student body purchases bus passes	60%	80%	
5: FEASIBILITY	Annual number of temporary/pilot projects to demonstrate the effectiveness of bicycle or pedestrian improvements on a roadway	1 demo per year	1 demo per year	Public Works, Planning Department, and TSG / TAC / LBAC

TSG = Transportation Safety Group / TAC = Transportation Advisory Committee / LBAC = Lexington Bicycle Advisory Committee

[26] Note that meeting these benchmarks could have significant impact on budget and staff capacity. Five-year Capital Plans among various departments will need to be coordinated so the Town can seize upon small and large opportunities to improve the bicycle and pedestrian network in Lexington.

5.3 Next Steps and Conclusion

Implementation of the nearly 300 recommendations will be a long-term, multi-phase effort involving several Town agencies, committees and boards, the Town Manager's office, and the Select Board. Help will be needed from elected officials at the state level and state agencies, primarily MassDOT. The following are the critical next steps to achieve this goal.

- The Town-wide Bicycle and Pedestrian Plan should be adopted by the Lexington Select Board as the formal guiding document for bicycle and pedestrian improvements in the town.
- Lexington Public Works Department should quickly ascertain which of the TBPP's recommendations coincide with DPW projects currently on the roadway repaving and/or sidewalk repair list, or recommendations that overlap with projects that have been programmed into the Town's Capital Budget.
- The Lexington Planning Department and/or Town Manager—potentially with assistance from State Representatives and/or Senators -should schedule a coordination meeting with MassDOT District 4 to discuss logistical and funding opportunities to incorporate bicycle and pedestrian facility recommendations made on state roads within the TBPP.
- The Lexington Planning Department should schedule coordination meetings with planners from surrounding communities to discuss recommended bicycle, pedestrian, and trail projects that could provide enhanced links between towns, e.g., Waltham Street bike lanes to the Waltham Line, Mass Ave East bike lanes to the Arlington Line, or sidewalk and trail improvements along the Adams and North Street corridors to Burlington.
- A dedicated staff person from Public Works, the Planning Department, or the Town Manager's office should commit a significant proportion of their time to the implementation of the TBPP. This will be needed to ensure the necessary coordination between departments, facilitate fund raising efforts where needed, help manage the recommended programs, and potentially manage contractors and consultants.
- To accommodate the growing maintenance needs with the implementation of the many bicycle and pedestrian facility recommendations, the Town should increase the budget for the Department of Public Works accordingly. The increase could be based on the proportional increase in the quantity of sidewalk miles, the number of new flashing beacons, and other pieces of infrastructure. Additional funds will be used to increase staff capacity and purchase new equipment.

As of the end of 2023, the Town of Lexington has established itself as a walkable and bike-friendly community. Thousands of residents live within a short walk or bike ride to a wide variety of places to shop, eat, recreate, attend a house of worship, or spend time at the library. Many more have children who currently walk or bike to the many neighborhood-based schools in Lexington and all three middle and high schools are centrally located for nearly all students. The Minuteman Bikeway and connecting trails and pathways form the spine of a strong trail network for commuting,

recreation, and errands. Despite these successful characteristics, more work needs to be done to encourage more bicycling and walking, and a more accessible community for people of all ages and abilities. The project and program recommendations are designed to make Lexington one of the most walkable and bike-friendly Towns in the Commonwealth and enhance the quality of life for its nearly 34,000 residents.

Appendices

A Lexington Town-wide Bicycle and Pedestrian Plan Online Survey Results (posted on the website)

B Policy Analysis and Recommendations for Electric Powered Micromobility Devices Memorandum (James Tasse Consulting)

C Project Prioritization Criteria and Scoring Rubric Memorandum

D Table of Prioritized Projects (posted on the website)

Appendix A Lexington Town-wide Bicycle and Pedestrian Plan Online Survey Results is posted on the website:

https://www.lexingtonma.gov/1621/Town-wide-Bicycle-and-Pedestrian-Plan

Appendix B Policy Analysis and Recommendations for Electric Powered Micromobility Devices Memorandum

September 19, 2023

James C. Tassé, PhD
James Tassé Consulting

Executive Summary

As part of the process for developing a Town-wide Bicycle and Pedestrian Plan in 2023, the Town of Lexington is exploring how to "address challenges related to the increasing number and type of electric-assist bicycles and other E-vehicles needing accommodation," and is seeking "recommendations as to appropriate policy to ensure safety of all users."

This technical memorandum is based on an overview of the policy, infrastructure, and enforcement contexts nationally, throughout New England, and in Lexington for what are often called "E-micromobility" devices and offers some recommendations to manage common concerns with these electric-powered transportation devices and small-scale vehicles.

The following E-micromobility devices are the focus of this report and are defined in the next section:

- E-bicycles (Classes 1-3; also referred to throughout this memorandum as "E-bikes")
- E-scooters (standing or sitting)
- Other E-Micromobility Options
- E-skateboards (including One Wheels)
- Hoverboards
- E-unicycles

In general, across the US, with the exception of E-bikes, there is considerable variability in how E-micromobility devices are regulated. While some devices (E-skateboards, in particular) still operate in an ambiguous legal zone, best practice appears to advise operators to behave like bicycle riders on public ways.

This memorandum makes the following recommendations for the Town of Lexington:

- Since E-bikes and E-scooters are already regulated under Massachusetts state law, and it is recommended that the Town of Lexington follow state law and permit these devices to use all public ways open to bicycles, including the Minuteman Bikeway and all other shared use paths where bikes are already permitted.
- While the legality of E-boards may be uncertain, it is likely that these devices are already appearing on public ways in Lexington. Unless law enforcement plans to step up enforcement actions on these devices, Lexington should adopt "rules of the road" for these devices that generally align with bicycle operational rules.
- Creating educational signs, handouts, stickers, web assets, etc. will permit the public to be educated on the behaviors the Town of Lexington would like to see practiced by E-micromobility users.
- Revise the current "No Motor Vehicles" signs at trailheads and intersections along the Minuteman Bikeway to explicitly allow for electric-assist bicycles and other micromobility devices. The additional plaque could say: "except e-assist".
- Defining micromobility and E-micromobility in Town ordinance will clarify that everything from a kick scooter to an electric skateboard is addressed by local transportation policy.

- Continuing discussions with all of the Minuteman Bikeway communities and adjacent towns regarding what other communities, such as Boulder Colorado, have done to regulate human- and electric-powered micromobility users. This will permit Lexington residents and officials to explore, discuss, and address the use of these new devices on public ways.
- Focus on moderating behavior through encouragement and education.
- Expecting more growth in these modes, and planning to expand infrastructure to support them, will enable the Town to position itself for a greener, less auto-dependent future.
- Continue to foster an expectation of reasonable behavior and speeds on the Minuteman Bikeway through the practice of community engagement and good riding behavior, while deterring negative practices on the path. The Lexington Police Department will continue this practice as staffing allows to make the path safe and enjoyable for all who use it.

Defining Micromobility and E-Micromobility

The "electric-assist bicycles and other E-vehicles" Lexington is seeking information on are generally included in a new category of transportation devices broadly known as "micromobility."

Micromobility

The Federal Highway Administration (FHWA) broadly defines "micromobility" as

"any small, low-speed, human- or electric-powered transportation device, including bicycles, scooters, electric-assist bicycles, electric scooters (E-scooters), and other small, lightweight, wheeled conveyances."

FHWA further observes that "micromobility has rapidly proliferated in cities nationwide, proving to be a popular transportation option for many users."[27]

Micromobility devices are available as either devices for individual ownership, or increasingly, as part of "fleets" for shared use, such as bike share systems. Users pay for and unlock devices for use in defined areas, and return them to docking stations or, in some cases, dockless devices are returned to designated parking or catchment areas.

Electric-Powered Micromobility (E-Micromobility)

A subset of micromobility includes "electric-powered micromobility" or "E-micromobility" devices, which include pedal-assist bicycles—two-wheel bikes, tricycles, and cargo bikes—electric scooters, electric skateboards, electric mono-wheels, and other devices (See Figure 1). These devices are equipped with rechargeable batteries and motors that either assist the operator's efforts (in the case

27 https://www.fhwa.dot.gov/livability/fact_sheets/mm_fact_sheet.cfm;

of pedal-assist bicycles) or move the device without human exertion beyond balancing and steering. They are generally limited to "human-scale" operational speeds of around 20 mph (although some E-bikes have a maximum speed of 28mph), and to motors of 750w or less.[28] They are typically present as either individually-owned devices, or as part of E-bike or E-scooter share systems.

Figure 1: Common E-Micromobility Devices

<table>
<tr>
<td>
E-bike

(Class 1, 2, or 3. See Appendix A)</td>
<td>
Standing/Sitting E-Scooter</td>
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<tr>
<td>
E-Skateboard</td>
<td>
One Wheel</td>
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</table>

28 Note that there are E-devices that can go faster than 28mph or which have motors exceeding 750w. Such devices exist in an even more ambiguous regulatory space than the devices discussed here. Due to their operating speeds that exceed a "human scale," these devices are excluded from the definition of micromobility/E-micromobility used in this report, and may be generally incompatible with bike/ped infrastructure.

Hoverboard	Electric Unicycle

E-micromobility is the primary subject of this technical memorandum. For detailed descriptions of each device, and how they are typically regulated in the US, please see Appendix B1.

Apart from E-bikes, and to some extent, E-scooters, E-micromobility devices are being introduced to the American transportation system without much consideration of their legality or best operational practices. E-micromobility devices generally share—and sometimes compete for—operational space with traditional "human-powered micromobility" users (i.e., standard bicycles, skateboards, and scooters without electric motors), as well as pedestrians and wheelchair users.

As a result, E-micromobility devices can present challenges to community designers and policy makers, who need to consider where these new devices should operate, what sort of regulatory framework should govern their use and what the best practice norms of behavior are. While it is important to consider the impacts of these new devices, it is also necessary to bear in mind that they are being used by fellow citizens and may represent mobility choices that are at least partly driven by desire to avoid the financial cost and climate impacts of automobiles. Public policy at local, regional, or state levels should be cautious of adopting positions that are reactionary or discriminatory because these devices are new and unfamiliar, or may occasionally be used in a disrespectful or dangerous manner. Applying the rules for bicycles, which operate at approximately the same speeds, is the most widely adopted approach to regulating these devices and educating users in other states and municipalities.

Current Lexington Policy on Bikes, E-bikes, and Pedestrians

The Town of Lexington is making a commitment to improve access for people walking, bicycling, and rolling. Section 7 of the town's Comprehensive Plan, entitled "Transportation and Circulation," summarizes a number of public desires and policy changes related to improving mobility, and especially bike/ped access[29]. Objective 7.2 includes a desire to "Improve and expand options for walking, biking, and micromobility throughout Lexington," explicitly referencing the promotion of "micromobility" as a goal.

"Micromobility" is defined in the Lexington Comprehensive Plan as:

[29] See https://www.lexingtonma.gov/DocumentCenter/View/6951/10-Goal-7-Transportation?bidId=

"a range of small lightweight devices operating at speeds typically below 15 mph and ideal for trips up to 6 miles. Micromobility modes can be shared or privately owned devices that are human-powered or electric[30]."

Lexington's definition of micromobility includes the sub-category of E-micromobility.

Despite this commitment to the new mode, existing Lexington ordinance language[31] does not define micromobility devices or operational rules for them clearly. Lexington is not unique in this regard—few municipalities in the country currently do so.

The pertinent sections of Lexington code that regulate bicycles, pedestrians and micromobility include the following definitions:

PEDESTRIAN

Any person afoot or riding on a conveyance moved by human power, except bicycles or tricycles.

TRAFFIC

Pedestrians, ridden or herded animals, vehicles, streetcars or other conveyances, either singly or together, while using any street or highway for the purpose of travel.

VEHICLE

Every device in, upon or by which any person or property is or may be transported or drawn upon a highway, including bicycles when the provisions of these rules are applicable to them, except other devices moved by human power or used exclusively upon stationary rails or tracks and devices which derive their power for operation from stationary overhead wires."

Micromobility as a class of user is not presently described in Town ordinance. The definition of "pedestrian" can be construed to refer to users of kick scooters or skateboards, and thus may extend to some micromobility users the same rights of access to public ways that persons walking have.

There is no definition of bicycle, motorized bicycle, motorized scooter, or motorized skateboard, although all of these devices would appear to be "vehicles" under town code. E-bikes are not defined in Lexington ordinance. These gaps in definition and operational guidance create some conflict with state law, which has sharper language describing E-bikes, at least.

With respect to operation, Lexington ordinances[32] say the following with respect to bicycle and motorized device operation:

Part I, General Bylaws, Chapter 100 Public Ways and Spaces, § 100-2

[30] https://www.lexingtonma.gov/DocumentCenter/View/6951/10-Goal-7-Transportation?bidId=. p.7-16 *Footnote 12*

[31] Language can be found at https://ecode360.com/10607505

[32] https://ecode360.com/10535212

Use of streets, sidewalks and public places.

Except as hereinafter provided, no person shall use or operate on any sidewalk or independent bicycle path any motorized vehicle, except a wheelchair, maintenance vehicle, or a police or fire emergency or patrol vehicle.

(1) Non-motorized bicycles may be ridden on independent bicycle paths, designated by the Select Board and marked as bike paths or bike routes. When necessary and in the interest of public safety, non-motorized bicycles may be ridden on sidewalks, except within business districts and within such other areas as may be designated by the Select Board.

(2) In all other respects, bicycles shall be operated according to Chapter 85, Section 11B of the General Laws of Massachusetts.[1]

In Lexington ordinance, it is not clear just what "non-motorized bicycles" are, and whether such language is intended to restrict the use of E-bikes. The phrase "non-motorized bicycles" exists in tension with Massachusetts law, which explicitly excludes E-bikes from the definition of "motorized bicycle" or "motor vehicle" (for details on Massachusetts Law on E-bikes and other devices, see Appendix B4). Under state law, an E-bike is regulated as a "non-motorized bicycle," but it is not clear that Lexington holds the same position.

As a result of this terminological ambiguity, under Massachusetts state law, it appears that E-bikes are permitted on "independent bicycle paths" in Lexington, or anywhere else an unpowered bicycle is permitted in the town. This would include the Minuteman Bikeway, as well as on any local conservation and recreation trails where "traditional" unpowered bikes are permitted. But the Town's definition of, and position on, the use of E-bikes is not clearly spelled out, and any effort to restrict E-bike access to public ways based on town code would appear to conflict with state law.

For devices other than E-bikes, the situation is even less clear. E-micromobility devices are not specifically mentioned in Lexington ordinance, and their use is not explicitly regulated.

The absence of clear rules governing E-micromobility in current ordinance highlights a gap in Lexington code. The creation of a bike/ped plan for the town should include directives to proactively define and manage these new devices.

Recommendations for E-Micromobility Policy for Lexington

The following are draft operational and broader policy recommendations for the Town of Lexington with respect to E-micromobility devices.

Operational Recommendations

All local speed limits and restrictions apply, including the recently-posted advisory speed limit of 15 mph on the Minuteman Bikeway and on any other trails or ways in the town.

A. **E-bikes**. It is recommended that Class 1 and Class 2 E-bikes be permitted to operate anywhere a traditional human powered bicycle may be operated as per Massachusetts law including:
a. Multi-use paths (including the Minuteman Bikeway and any other mixed-use path or trail in town
b. Sidewalks as limited in Lexington code Part I, General Bylaws, Chapter 100 Public Ways and Spaces, § 100-2.
B. E-bikes should follow all rules that apply to "traditional" bicycles in Lexington with respect to locations where they can/cannot be ridden.
C. Class 3 E-bikes should be considered as allowable as long as they operate at the recommended 15 mph limit.
D. Lexington should develop and share E-bike operational education resources.

Note that under Massachusetts law, restrictions on the use of E-bikes on public ways require a process that includes public meetings:

"A municipality, local authority or state agency with jurisdiction over a bike path or bikeway after public notice and a public hearing may adopt ordinances or regulations prohibiting or otherwise regulating the operation of electric bicycles on such paths, including, but not limited to, the imposition of speed limits."[33]

Attempting to restrict the use of E-bikes on pathways currently open to bicycles would presumably necessitate following the state-mandated process.

E. E-scooters. It is recommended that E-scooters should be permitted on multi use paths, bike lanes, and roadways, including:
a. the Minuteman Bikeway
b. Sidewalks as limited in Lexington code Part I, General Bylaws, Chapter 100 Public Ways and Spaces, § 100-2.
F. E-scooters should follow all rules that apply to "traditional" bicycles in Lexington with respect to locations where they cannot be ridden.
G. Lexington should develop and share E-scooter operational education resources.

Note that E-scooters appear to be subject to the current requirement for operators to possess a valid drivers' license under Massachusetts General Laws, Part I, Title XIV, Chapter 90, §1E to operate on public ways. Defining E-scooters in a way that excludes them from licensing requirements at the town level may be possible; town legal counsel should be consulted.

H. **Other E-micromobility Devices**. Electric skateboards (including One Wheels), Hoverboards, and Electric Unicycles appear to meet the definition of "motor vehicle" in both Massachusetts law and Lexington ordinance. Because such devices do not generally meet the requirements for a motor vehicle to be used on public ways under state law, such devices operate in a legal gray area.
That said, in the absence of a plan to enforce a ban, providing educational signage and resources about the use of these devices—legal or not—may benefit all users. When they are present on public ways, E-

[33] https://www.mass.gov/info-details/mass-general-laws-c85-ss-11b-34

micromobility devices other than E-bikes and E-scooters should also be expected to operate according to rules generally applying to bicycles. If the Town of Lexington does not plan to enforce bans on these devices, the Town should consider adding ordinance language that would define them and clarify operational rules. Not that additional policy changes at the state level may be necessary to exempt these devices fully from motor vehicle rules—the town legal counsel should be consulted about making such changes.

Policy and Education Recommendations

1. Pro-actively define and regulate all micromobility devices in Lexington ordinance.

The lack of any reference in Lexington code to micromobility devices, electric or not, including what they are and how users of them should behave, creates uncertainty on the part of educators, law enforcement, planners, and facilities managers about how to talk about and manage these devices. As these devices are increasingly common, proactively defining this class of device in ordinance will help position town government for any additional specific regulatory actions directed at the devices.

A. Consider adding a general definition of micromobility to Lexington ordinance section, e.g.: "Micromobility device" means a small, lightweight (sub 120 pound) low-speed human-powered or electric-powered transportation device, including a scooter, skateboard, electric scooter, electric skateboard, or other wheeled conveyance that has a top speed of 28 miles per hour or less.

The 120-pound weight limit is suggested to include electric-assist cargo bikes in the general definition of micromobility.

Add language clarifying that, under Lexington Code § 100-2 "Use of streets, sidewalks and public places," the word "bicycle" shall include E-micromobility devices to indicate that such devices must follow bicycle rules.

B. Consider adding language to Lexington Code that explicitly defines E-bikes according to Massachusetts state law as per Massachusetts General Laws c.90 § 1 "Definitions" and regulates them as bicycles as per Massachusetts General Laws c.85 § 11B ¾

C. Consider adding a section to code referencing "Additional Rules for E-Micromobility Devices" and include any limitations on where they can operate (such as Lexington conservation and recreation properties where bicycles are already restricted), speed, additional equipment, etc. which may be established through public processes if they are different from operational rules which apply to bicycles.

D. Note that under Massachusetts law, restrictions on the use of E-bikes on public ways require a process that includes public meetings:

"A municipality, local authority or state agency with jurisdiction over a bike path or bikeway after public notice and a public hearing may adopt ordinances or regulations prohibiting or otherwise regulating the

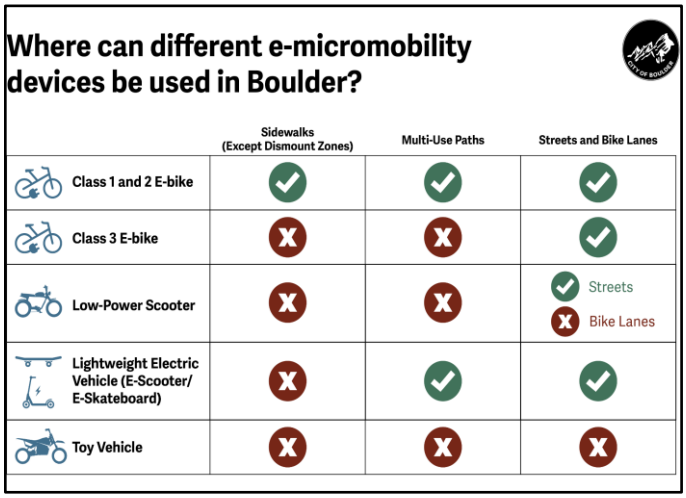
operation of electric bicycles on such paths, including, but not limited to, the imposition of speed limits."[34]

Attempting to restrict the use of E-bikes on pathways currently open to bicycles would necessitate following the state-mandated process.

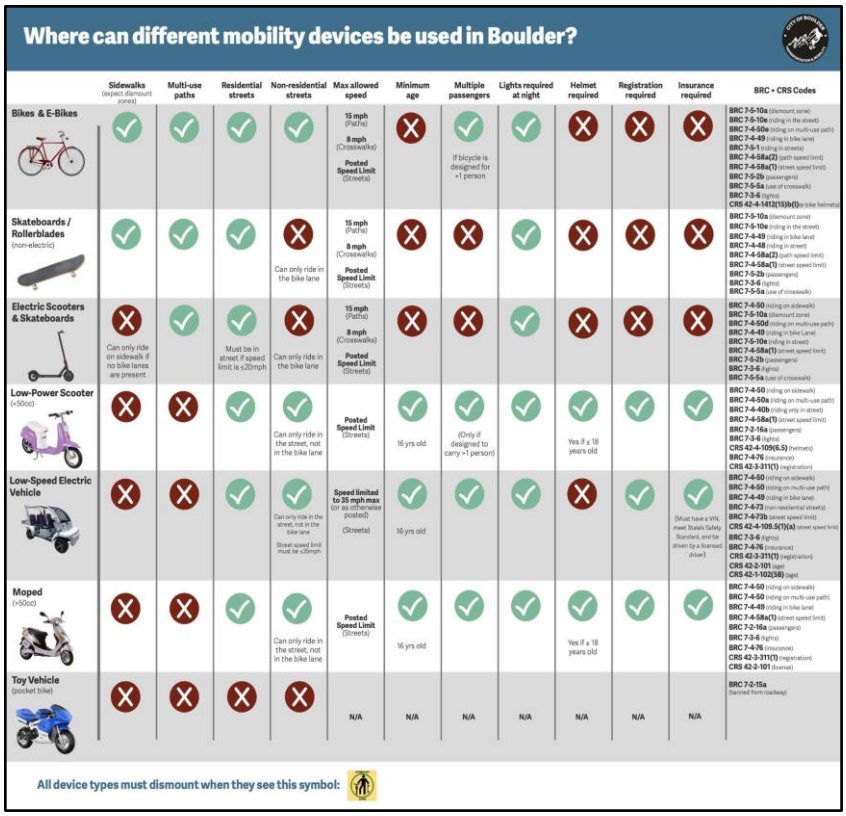
2. *Develop signage and other resources that educate users on the use of E-micromobility devices on public ways.*

E-micromobility devices are here to stay, and proactively developing resources to educate users with rules for their operation that would generally align them with bicycle rules is recommended. These might include web-based resources, signs, handouts, and pavement markings, as well as public informational forums or events in the field. See Figure 2 for examples of exemplary educational resources developed by Boulder, Colorado, to guide users on where different types of micromobility devices may be used.

Figure 2: Boulder CO educational resources for micromobility devices



[34] https://www.mass.gov/info-details/mass-general-laws-c85-ss-11b-34)


Where can different mobility devices be used in Boulder?
Sidewalks (expect dismount zones)
Multi-use paths
Residential streets
Non-residential streets
Max allowed speed
Minimum age
Multiple passengers
Lights required at night
Helmet required
Registration required
Insurance required
BRC + CRS Codes
Bikes & E-Bikes
15 mph (Paths)
8 mph (Crosswalks)
Posted Speed Limit (Streets)
If bicycle is designed for >1 person
Skateboards / Rollerblades (non-electric)
Can only ride in the bike lane
Electric Scooters & Skateboards
Can only ride on sidewalk if no bike lanes are present
Must be in street if speed limit is ≤20mph
Low-Power Scooter (<50cc)
16 yrs old
(Only if designed to carry >1 person)
Yes if ≤ 18 years old
Low-Speed Electric Vehicle
Speed limited to 35 mph max (or as otherwise posted)
Moped (>50cc)
Toy Vehicle (pocket bike)
N/A
All device types must dismount when they see this symbol:

3. Launch a public process to discuss/adopt the guidance for micromobility use employed by other municipalities such as Boulder, CO.

Ultimately, what kinds of powered and unpowered micromobility devices are permissible in certain contexts is a local decision. Review of policies from across the country reveal that Boulder, CO, has perhaps the most comprehensive management scheme for these devices. Lexington should consider reviewing Boulder's policies in a public process and adopt them as needed/desired. In the longer term, any restrictions or relaxing of rules governing E-micromobility may require additional policy work at the state level to avoid conflicting with Massachusetts state law.

4. Anticipate and plan for providing more infrastructure and increasing the width of the Minuteman Bikeway to twelve feet where feasible and other shared use paths to ten feet.

As volumes of all active transportation users grows, additional infrastructure may be needed to accommodate the increased traffic. This should include more bike lanes, more and wider multi-use paths, wider sidewalks, etc. While rights of way and other constraints may exist that restrict widening public ways, including trails, the general policy of the town should be to expect more use and to plan to expand facilities as much as is feasible.

5. Explore strengthening community collaborations to encourage safe behavior on the sidewalks and the Minuteman Bikeway.

Massachusetts state law defines a public way as follows (see Appendix B4, below):

"Way'', any public highway, private way laid out under authority of statute, way dedicated to public use, or way under the control of park commissioners or body having like powers.[35]

Based on this definition, the Minuteman Bikeway appears to be a public way. Some confusion over the exact status of the corridor may linger as the MBTA apparently retains ownership, and so the bikeway is not, in some quarters, considered a public way. Nonetheless, as Massachusetts statute includes some "private ways" in its definition of public way, the Minuteman Bikeway would appear to meet the statutory definition of a public way but may not be considered a road where traffic laws are enforced.

The Lexington Police Department has a long-standing practice of monitoring the use of the Minuteman Bikeway. Through the practice of community engagement, officers have rewarded good riding behavior while deterring negative practices on the path. The Lexington Police Department will continue this practice as staffing allows to make the path safe and enjoyable for all who use it. The department does not feel that actively enforcing bicycle violations and citing riders promotes a collaborative relationship between the police and the community.

Lexington Town government may wish to explore how the community can collaborate to enforce expectations of safe riding. If the Town wishes to explore, if allowed under state law, adding an ordinance clarifying that the Minuteman Bikeway is a public way and that Lexington police are authorized to enforce traffic law on it, including speed limits and any restrictions on the types of devices used on them, legal counsel will be needed and additional staff will be needed.

It may be necessary to also amend the Minuteman Bikeway advisory speed limit so that it has the strength of an ordinance and is subject to enforcement.

It is worth noting that many E-bikes are shipped without speedometers on them, which may further complicate enforcement efforts. Community policing, visual speed message boards and education may help users understand a responsible human-scale speed on shared use facilities.

Town legal counsel should be consulted before making any such changes.

[35] https://www.mass.gov/info-details/mass-general-laws-c90-ss-1

Conclusions

E-bikes and E-scooters are already regulated under Massachusetts state law, and it is recommended that the Town of Lexington follow state law and permit these devices to use all public ways open to bicycles, including the Minuteman Bikeway and all other shared use paths where bikes are already permitted.

While the legality of E-boards may be uncertain, it is likely that these devices are already appearing on public ways in Lexington. Unless law enforcement plans to step up enforcement actions on these devices, Lexington should adopt "rules of the road" for these devices that generally align with bicycle operational rules.

Creating educational signs, handouts, stickers, web assets, etc. will permit the public to be educated on the behaviors the Town of Lexington would like to see practiced by E-micromobility users.

Defining micromobility and E-micromobility in Town ordinance will clarify that everything from a kick scooter to an electric skateboard is addressed by local transportation policy.

Convening a public process to discuss what other communities, both local municipalities and others like Boulder Colorado, have done to regulate human- and electric- powered micromobility users will permit Lexington residents and officials to explore, discuss and address the use of these new devices on public ways.

Expecting more growth in these modes, and planning to expand infrastructure to support them, will enable the town to position itself for a greener, less auto-dependent future.

Exploring whether the Minuteman Bikeway can be defined as a public way that Lexington police can enforce a speed limit or device bans would permit community policing opportunities and help educate the public on desired behavior.

Appendix B1

Detailed Descriptions of E-Micromobility Devices

Low-Speed Electric Bicycles

The very first electric bike patents date back to the 1890s, just a few years after the standard diamond frame bicycle as we know it arrived in the mid-1880s. As one of the oldest forms of E-micromobility, the policies regulating electric-assist bicycles are the most mature.

The development of "pedal assist" technology in 1989 created the E-bike as we know it today. Pedal assist E-bikes provide motor power only when the pedals are turning and create a more genuinely "bicycle-like" experience than the older versions of E-bikes that relied on throttles to control the motor. Riding a pedal-assist E-bike is not effort-free and offers a riding sensation that might be described as amplifying muscular effort.

According to People for Bikes, a national bicycle and E-bicycle advocacy group:

Electric-assisted bicycles have been defined and regulated at the federal level since 2002. Public Law 107-319 established that electric bicycles are regulated as consumer products under the Consumer Product Safety Act, and more specifically, subject to the same regulations that govern traditional, human-powered bicycles. Thus, electric bicycles are regulated by the Consumer Product Safety Commission and must comply with the bicycle safety standards at 16 C.F.R. Part 1512. In addition, electric bicycles are explicitly not "motor vehicles" for the purposes of federal law and are not subject to National Highway Traffic Safety Administration vehicle standards. As a practical matter, Public Law 107-319 ensures that electric bicycles are designed, manufactured, and tested like traditional bicycles for the purposes of consumer product safety law. The main provisions of Public Law 107-319 are codified at 15 U.S.C. § 2085.

Under federal law, an electric bicycle is referred to as a "low-speed electric bicycle," which is defined as "a two- or three-wheeled vehicle with fully operable pedals and an electric motor of less than 750 watts (1 h.p.), whose maximum speed on a paved level surface, when powered solely by such a motor while ridden by an operator who weighs 170 pounds, is less than 20 mph." Significantly, this definition provides a maximum assisted speed that an electric bicycle can travel when being powered only by the motor, but does not provide a maximum assisted speed for when an electric bicycle is being powered by a combination of human and motor power[36].

[36] https://www.peopleforbikes.org/electric-bikes/policies-and-laws

Starting in 2010, People for Bikes began an effort to enact policy across the country that standardizes the types of E-bikes available for sale in the US into three classes:

<table>
<tr><th>Type</th><th>Power actuation</th><th>Assist cut-off</th><th>Power Limit</th></tr>
<tr><td>Class 1 E-bike</td><td>Pedal-assist only</td><td rowspan="2">20 MPH</td><td rowspan="3">750 watts</td></tr>
<tr><td>Class 2 E-bike</td><td>Throttle (usually with pedal assist)</td></tr>
<tr><td>Class 3 E-bike</td><td>Pedal-assist only</td><td>28 MPH</td></tr>
</table>

Class 1 E-bikes are "pedal assist only" bicycles, meaning the motor only boosts the rider when the pedals are turning. The motor assist is limited to a top speed of 20mph, and the motor size may not exceed 750 watts. These E-bicycles are generally permitted for use in most places a traditional bicycle can be used.

Class 2 E-bikes are pedal assist but also come equipped with a throttle on the handlebars that permits the motor to be used *without* the pedals turning. The motor assist is limited to a top speed of 20mph, and the motor size may not exceed 750 watts. These E-bicycles are sometimes restricted from mountain bike trails and National Park paths but are generally permitted for use in most places a traditional bicycle can be used.

Class 3 E-bikes are "pedal assist only" bicycles, meaning the motor only boosts the rider when the pedals are turning. The motor assist is limited to a top speed of 28mph, and the motor size may not exceed 750 watts. These E-bicycles are typically legal for use in roadway rights of way or on paths where the managing authority has authorized their use.

E-bicycles can be difficult to distinguish from traditional un-assisted bikes. Tell-tale signs include the presence of a bulky rear hub ("hub drive") or bottom bracket area ("mid-drive") where the motor is, and a battery pack, usually located on a rack above the rear wheel or on/in the down tube of the bicycle.

It is also a challenge to visually differentiate between the different classes of E-bicycles. Many kinds of E-bicycles are sold as various classes, so it is hard to tell with just a casual look what class an E-bike may be, i.e., there are Class 1, 2, and 3 Commuters, road bikes, and cargo bikes etc. E-Mountain Bikes are typically only Class 1 or 2. The salient differences are that Class 2s always have a throttle, and Class 3s can go up to 28mph. Class 3 E-bikes are sometimes identifiable by a larger battery pack (often visible as an especially

thick down tube). All E-bikes sold in the US are supposed to have a sticker on them, usually located low on the seat tube or down tube, which identifies what class it is.

See Figure 3 for a typical mid-drive Class 2 E-bike with the battery on the rear rack, and Figure 4 for an image of a hub motor.

Figure 3

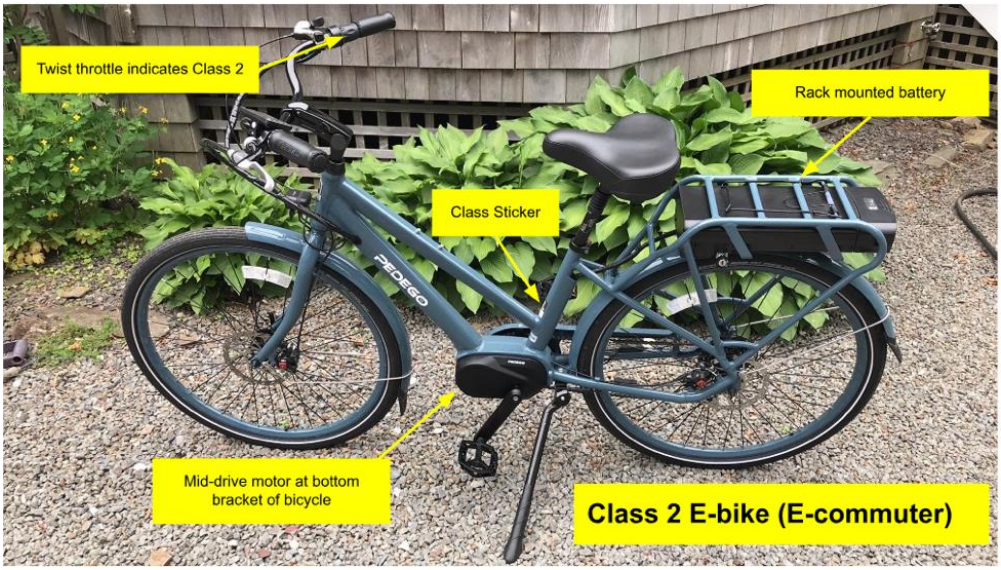

Twist throttle indicates Class 2
Rack mounted battery
Class Sticker
Mid-drive motor at bottom bracket of bicycle
Class 2 E-bike (E-commuter)

Figure 4—an E-bike hub motor

Thirty-nine states, including Massachusetts, have adopted all (or parts) of the three class E-bike classification system. Operating guidelines vary from state to state (See Figure 4 Appendix B2, below) but generally treat Class 1 and Class 2 E-bikes as "traditional" un-assisted bicycles. With a top speed of 20mph, Class 1 and Class 2 E-bikes operate within "human scale" speeds that are easily attainable on

unassisted bikes. Because of their higher top speed of 28 mph, Class 3 bicycles are often restricted to roadways and banned from multi-use paths unless authorized by the facility manager.

Several states have motor wattage limits that are different from the 750 watt standard in the three class system.

The National Conference of State Legislature's "primer" on E-bike law notes that

Of the 43 states and D.C. that define E-bikes, some state laws, such as in Arizona, Minnesota, Utah and Washington, specifically allow E-bike operation on facilities such as bicycle paths or greenways, with the caveat that many carve out exceptions for localities to enact stricter operation regulations on such bike and pedestrian facilities. In Delaware, Iowa and Nebraska, electric bicycles are defined within the existing definition of a bicycle, therefore there is not a distinction when it comes to operation on trails. Vermont specifies that motor-assisted bicycles are governed as bicycles and have the same rights and duties applicable to bicyclists. Hawaii's law does not include restrictions on where E-bikes may operate.[37]

E-bike Fleets in Bike Share Systems

According to US DOT, bike share systems (on-the-street businesses offering bicycles available for self-serve public rental and use) currently serve approximately 35 cities in the US, and after a decline between 2020 and 2022, the use of existing docked bike shares (systems that use specific parking stations for storage and rental access) is again exceeding 2019 levels.[38]

A number of bikeshare fleets around the world are adding E-bikes, and the "Bike Share World Map" curators report that:

"Since August 2021, the number of bike-sharing systems with E-bikes has grown by 62.9% and the number of E-bikes increased by 72.95%."[39]

The North American Bicycle Share Association (NABSA) in its 2023 "State of the Industry" report states that in shared use systems, "The number of trips taken on E-bikes increased from 18.8 million in 2021 to 30.9 million in 2022."[40] The inclusion of E-bikes into bike share fleets that prove to be viable is likely to continue to expand. Lexington, significantly, is located near Boston and may see users on the BlueBikes system, which is one of the largest bike share systems in North America, but which does not yet appear to have any E-bikes in the fleet.

Most municipalities do not impose limitations on where E-bikes in shared systems may operate and treat them generally like unpowered bike share bicycles. Where limitations do explicitly exist, E-bike share bicycles are most often prohibited from sidewalk operation.

[37] https://www.ncsl.org/transportation/statE-electric-bicyclE-laws-a-legislativE-primer#registration

[38] https://data.bts.gov/stories/s/Summary-of-Docked-BikesharE-Trips-by-System-and-Ot/7fgy-2zkf/

[39] https://bikesharingworldmap.com/reports/bswm_mid2022report.pdf

[40] https://nabsa.net/2023/08/23/2022industry/

E-Scooters

An E-scooter may be broadly defined as a device:

"Weighing less than one hundred pounds that is equipped with two or three wheels, handlebars, and an electric motor, and which is solely powered by the rider or by an electric motor capable of propelling the device without additional propulsion supplied by the rider, at a maximum speed on a paved level surface of no more than twenty miles per hour, or both."[41]

Note that some manufacturers sell scooters that exceed 20 mph.

E-scooter regulation at the federal level is not consistent or clear.

State law in some cases defines them, and sometimes imposes rules for operators (licensing, registration, age limits) and locations where their use is permitted. Local municipalities often further define their operational rules and limits, which often coincide with bike, moped, or motorcycle law.

E-scooters are often included in older definitions of "motorized scooters" (devices more like Vespa scooters, etc) and this association often stipulates possession of drivers' license to use them on public ways. A further complication exists when places (e.g., Boulder, CO) make a distinction between motorized scooters and "lightweight electric devices," a description that is used to define the kind of scooters used in shared systems. They are sometimes included with bicycles with respect to operational rules.[42]

Non-motorized scooters (i.e., a board with a handle but no motor) are typically regulated as skateboards.

E-scooter Shares

US DOT reports that as of July 2022, 158 municipalities had E-scooter share systems, and evidence suggests that these systems are growing faster than bike shares. Most municipalities do not impose limitations on where E-scooters in shared systems may operate and treat them generally like unpowered bike share bicycles. Where limitations do explicitly exist, E-scooters are most often prohibited from sidewalk operation.

E-Skateboards

E-skateboards are motorized skateboards with either one or four wheels upon which an operator stands and moves sideways. Regulation at the federal level is non-existent. "One Wheel" brand E-boards are the subject of warnings from the US Consumer Product Safety Commission.[43]

[41] https://www.lawinsider.com/dictionary/electric-scooter

[42] https://mankeel-store.com/what-arE-thE-regulations-for-electric-scooters-in-thE-us/

[43] https://www.cpsc.gov/Newsroom/News-Releases/2023/CPSC-Warns-Consumers-to-Stop-Using-Onewheel-Self-Balancing-Electric-Skateboards-Due-to-Ejection-Hazard-At-Least-Four-Deaths-and-Multiple-Injuries-Reported

The inability of these motorized devices to meet minimum design standards for roadway use as "vehicles" has led some sources (including ones that are generally pro-skateboard) to acknowledge that they are likely "technically illegal" at the federal level.[44] State law in some places clarifies their status and sometimes imposes rules for operators and locations they are permitted, but the rules of operation are sometimes unclear. California, for example, apparently permits E-skateboards to operate contraflow like a pedestrian. Some sources recommend that E-skateboards only be operated on private property.

Some states and local municipalities often further define their operational rules and limits, which sometimes coincide with bike laws (e.g. Michigan[45]). Where rules exist, E-skateboards are often limited to 25mph or less and sometimes have wattage limitations on motors.

Note that some manufacturers sell E-skateboards that exceed 20 mph.

Shared E-skateboard systems do not appear to exist, but E-skateboards are available for rent at some shops around the nation.

Hoverboards

Hoverboards are wheeled board devices in which the operators' feet face forward on a platform and move forward on two wheels (unlike a skateboard, in which the operator moves sideways with respect to the orientation of feet). They might be understood as Segways without the handlebars. Hoverboards are more on the "toy device" end of the micromobility spectrum, but because they have some popularity and see use on public ways they are sometimes discussed and regulated at the state or local level. There are no federal laws on hoverboard operation.[46]

Shared E-hoverboard systems do not appear to exist.

E-unicycles

E-unicycles are devices with one wheel with foot platforms on either side of the wheel that the operator stands on facing forward. There are no federal rules governing the use of one wheels[47]. They are rarely mentioned in state law and are sometimes lumped in with E-bike rules by analysts. They would appear to conform to the definition of "motor vehicles" under many state laws. Some of these devices can exceed the top speeds of Class 3 E-bikes, putting them in a deeper legal gray area.

Shared E-unicycle systems do not appear to exist.

[44] https://eskatehub.com/guides-and-tips/electric-skateboard-laws-usa/

[45] https://eskatehub.com/guides-and-tips/electric-skateboard-laws-usa/

[46] https://www.gadgetreview.com/latest-hoverboard-law

[47] https://radicalcommute.com/electric-unicycles-legal/

Appendix B2: E-Micromobility Policy in the United States

Policies that regulate the use of these electric-powered devices are still relatively new and in a constant state of evolution, as new E-micromobility gadgets continue to appear and see use on public ways across the country. Electric-assist bicycles, which are the E-micromobility devices that have been around the longest, have prompted the development of regulatory policy and schemes that usually treat them as standard bicycles. Many states now have clear language describing where and how E-bikes may be used, but the rules around the use of E-skateboards, hoverboards, E-scooters, or E-mono-wheels are not as consistent or clear (See Figure 5).

Figure 5: US Policy on E-Micromobility Devices

Legend	
	Unregulated, unlegislated, unclear
	Legal generally, may include age, licensing or operational limits
	Legal but with restrictions that may limit utility e.g. cannot be used on roadways
	Banned in some form from public ways
	No Data
	New England State

State	E-Bikes	E-Scooters	E-Skateboards (including one wheels)	Hoverboards	Electric Unicycles
Alabama					
Alaska					
Arizona					
Arkansas					
California					

Colorado					
Connecticut					
Delaware					
Florida					
Georgia					
Hawaii					
Idaho					
Illinois					
Indiana					
Iowa					
Kansas					
Kentucky					
Louisiana					
Maine					
Maryland					
Massachusetts					
Michigan					
Minnesota					
Mississippi					
Missouri					
Montana					
Nebraska					
Nevada					
New Hampshire					
New Jersey					
New Mexico					

New York					
North Carolina					
North Dakota					
Ohio					
Oklahoma					
Oregon					
Pennsylvania					
Rhode Island					
South Carolina					
South Dakota					
Tennessee					
Texas					
Utah					
Vermont					
Virginia					
Washington					
West Virginia					
Wisconsin					
Wyoming					

As long as E-micromobility devices remain in the realm of human-scale mobility (lightweight, no enclosure, and speeds under 20 mph), and can obey bicycle traffic law (including having braking systems that permit them to stop as required by traffic control devices), this memorandum broadly recommends that public policy evolve so as to recognize that E-micromobility users:

- Should be permitted the use of the common public ways
- Should generally follow state law and best practice guidance for bicycle operations (especially: ride with traffic, obey traffic controls, use hand signals, be predictable)
- Should operate at safe human scale speeds and comply with any advisory speed limits
- Should not generally operate on sidewalks, but may be permitted in some areas where bicycles are also permitted to operate

- Should yield to pedestrians when present
- Should be covered under definitions of vulnerable users in law.

Appendix B3: New England Laws on E-Micromobility Devices

As with the rest of the country, E-micromobility policy in New England is fairly inconsistent, except in regard to E-bike regulation.

E-bikes

- All of the New England states have adopted the "3 Class System" except for Rhode Island which has a non-standard policy that People for Bikes calls "problematic."
- States that use the 3 Class system generally regulate E-bikes as bicycles.
- Massachusetts specifically recognizes Class 1 and Class 2 E-bikes but has no provision for Class 3 E-bikes at the state level.

E-Scooters

- New England states generally regulate E-scooters as "motorized scooters" restricted to sub 30mph speed.
- Connecticut state law permits E-scooters and requires them to operate as bicycles. A license for their use is not required. Some municipalities impose additional rules.
- Maine state law defines motorized scooters and requires a license for their operation. Some municipalities impose additional rules.
- Massachusetts state law defines motorized scooters and requires a license for their operation. Some municipalities impose additional rules.
- New Hampshire state law defines motorized scooters and requires a license for their operation. Some municipalities impose additional rules. (https://www.dmv.org/nh-new-hampshire/other-types.php)
- Rhode Island state law permits E-scooters; some municipalities impose additional rules.
- Vermont state law appears to classify E-scooters as "motor assisted" bicycles; some municipalities impose additional rules.

E-Skateboards

- Connecticut state law appears to ban E-skateboards from public ways as unregisterable motor vehicles.
- Maine state law appears to ban E-skateboards from public ways as unregisterable motor vehicles.
- Massachusetts state law is silent on E-skateboards
- New Hampshire state law is not clear on E-skateboards, and may include them with scooters
- Rhode Island state law regulates E-skateboards as a type of motor-vehicle
- Vermont state law is not clear on E-skateboards.

Hoverboards

- Connecticut state law is silent on hoverboards.
- Maine state law is silent on hoverboards.
- Massachusetts state law may consider hoverboards a form of Electric Personal Assistive Motorized Device, which imposes operational rules on them including
- Riders must be 16 years old or over
- Always yield right-of-way to foot pedestrians
- Always ride in a single file line
- Exceed no more than 12.5 mp/h
- Transport no more than one person
- Possess no more than two non-tandem wheels
- New Hampshire state law is not clear on hoverboards.
- Rhode Island state law may consider hoverboards a form of Electric Personal Assistive Motorized Device
- Vermont state law may consider hoverboards a form of Electric Personal Assistive Motorized Device, which have specific equipment requirements that most of the devices don't meet.

Electric Unicycles

The status of these devices is unclear in all New England states; registration and licensing may be required.

Appendix B4: Relevant Massachusetts State Law on Bicycles, E-bikes, and E-Scooters

Massachusetts Law on "Traditional" Bicycle Operation

https://www.mass.gov/info-details/massachusetts-law-about-bicycles

see also, specifically, https://www.mass.gov/info-details/mass-general-laws-c85-ss-11b

Massachusetts Law on E-bike Operation

https://www.mass.gov/info-details/mass-general-laws-c85-ss-11b-34

Massachusetts Legal Definitions

All definitions below are directly from:

https://www.mass.gov/info-details/mass-general-laws-c90-ss-1

Bicycle is not defined explicitly in state law

Electric Bicycle

Note that Massachusetts law is silent on Class 3 E-bikes

"Electric bicycle", a bicycle or tricycle equipped with fully operable pedals and an electric motor of 750 watts or less that meets the requirements of a class 1 electric bicycle or a class 2 electric bicycle.

Motorized Bicycle

A "motorized bicycle" does not include an E-bike

"Motorized bicycle", a pedal bicycle which has a helper motor, or a non-pedal bicycle which has a motor, with a cylinder capacity not exceeding fifty cubic centimeters, an automatic transmission, and which is capable of a maximum speed of no more than thirty miles per hour; provided, that the definition of "motorized bicycle" shall not include an electric bicycle.

Motorized Scooter

A "motorized scooter" does not include an E-bike

"Motorized scooter", any 2 wheeled tandem or 3 wheeled device, that has handlebars, designed to be stood or sat upon by the operator, powered by an electric or gas powered motor that is capable of propelling the device with or without human propulsion. The definition of "motorized scooter" shall not include a motorcycle, electric bicycle or motorized bicycle or a 3 wheeled motorized wheelchair.

Motorized scooters require a license to be used in MA:

A motorized scooter shall not be operated on any way by a person not possessing a valid driver's license or learner's permit, nor at a speed in excess of 20 miles per hour. [48]

Motor Vehicles

A "motor vehicle" does not include an E-bike or a motorized bicycle

"Motor vehicles", all vehicles constructed and designed for propulsion by power other than muscular power including such vehicles when pulled or towed by another motor vehicle, except railroad and railway cars, vehicles operated by the system known as trolley motor or trackless trolley under chapter one hundred and sixty-three or section ten of chapter five hundred and forty-four of the acts of nineteen hundred and forty-seven, vehicles running only upon rails or tracks, vehicles used for other purposes than the transportation of property and incapable of being driven at a speed exceeding twelve miles per hour and which are used exclusively for the building, repair and maintenance of highways or designed especially for use elsewhere than on the travelled part of ways, wheelchairs owned and operated by invalids and vehicles which are operated or guided by a person on foot; provided, however, that the exception for trackless trolleys provided herein shall not apply to sections seventeen, twenty-one, twenty-four, twenty-four I, twenty-five and twenty-six. The definition of "Motor vehicles" shall not include electric bicycles or motorized bicycles. In doubtful cases, the registrar may determine whether or not any particular vehicle is a motor vehicle as herein defined. If he determines that it should be so classified, he may require that it be registered under this chapter, but such determination shall not be admissible as evidence in any action at law arising out of the use or operation of such vehicle previous to such determination.

Way: **"Way'', any public highway, private way laid out under authority of statute, way dedicated to public use, or way under the control of park commissioners or body having like powers.**[49]

[48] https://malegislature.gov/Laws/GeneralLaws/PartI/TitleXIV/Chapter90/Section1E

[49] See also: https://www.mass.gov/doc/3280-public-way-gl-c-90-s-1/download#:~:text=Any%20street%20or%20highway%20that,as%20municipal%20streets%20and%20roads

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Appendix C Project Prioritization Criteria and Scoring Rubric Memorandum

To:	Sheila Page, Assistant Planning Director, Town of Lexington	**Prepared By:**	Phil Goff, Project Manager
Date:	October 11, 2023		
Project No.:	15929.00	**Project Name:**	Lexington Town-wide Bicycle and Pedestrian Plan

This memorandum has been prepared to summarize the parameters of the criteria used to prioritize project recommendations for the Town-wide Bicycle and Pedestrian Plan for the Town of Lexington.

INTRODUCTION TO PRIORITIZATION

Table 1 includes VHB's recommended criteria for evaluation of recommended projects. These are based on the following project goals established earlier.

TABLE 1: DRAFT EVALUATION CRITERIA

DRAFT EVALUATION CRITERIA			
Project Goals	**Criteria (up to 5 points each)** *Note: qualitative criteria are shown in Italics*	**Weighting**	**Max. Weighted Point Total**
1: SAFETY	Proximity to reported bicycle/pedestrian crashes	2	10
	Motor vehicle volume along roadway	2	10
2: CONNECTIVITY	*Addresses a critical gap in the trail/bicycle/pedestrian network*	1	5
	Proximity to public or private school (K-12)	3	15
	Proximity to public park or conservation land entrance	2	10
	Proximity to transit line (MBTA or Lexpress)	2	10
3: DESIGN	*Recommendation promotes "all ages and abilities" by providing separation from motor vehicles*	2	10
4: ECONOMY	Proximity to retail districts	2	10
	Proximity to tourist/cultural destination	1	5
5: FEASIBILITY	*Level of engineering complexity*	2	10
	Impact to existing on-street parking	2	10
	Level of expressed community support	1	5
TOTAL			**110**

SCORING RUBRIC

The criteria scoring shall be ranked on a scale of 1 through 5 (1 being low priority and 5 being a high priority). After weighting is set to prioritize some elements over others, the scoring total for any given trail, bicycle, or pedestrian network recommendation could score up to 110 as the highest score.

1. **Safety**
    a. **Proximity to Reported Bicycle/Pedestrian Crashes**
        - Description: Referencing crash data, determine the proximity of recommendation to reported bicycle/pedestrian crashes. The greater the number of crashes within a 100-foot buffer radius of the recommendation, the higher the priority to implement the recommendation to reduce crash risk for bicyclists and pedestrians.
        - Scoring
            - 0 = no crashes within 100 feet
            - 1 = 1 crash within 100 feet
            - 3 = 2 crashes within 100 feet
            - 5 = >3 crashes within 100 feet

    b. **Motor Vehicle Volume Along Roadway (Qualitative)**
        - Description: Roadways that carry more traffic typically have more opportunities for conflicts, thus separated bicycle and pedestrian infrastructure provides more benefit. Recommendations on roadways with higher levels of traffic will receive a higher score in this category.
        - Scoring
            - 1 = Roadway is a local, residential street and/or one that carries <1,000 vehicle trips per day
            - 3 = Roadway is a modestly-busy local street (typically 1,000-5,000 vehicle trips per day) or recommendation is a path/trail project
            - 5 = Busy state or local roadway with high traffic volumes (typically >5,000 vehicle trips per day)

2. **Connectivity**
    a. **Addresses a Critical Gap in the Trail/Bicycle/Pedestrian Network (Qualitative)**
        - Description: Does the recommendation remove a critical gap in the trail/bicycle/pedestrian network or provide connectivity to other active transportation facilities such as the Minuteman Bikeway, shared use paths, bike lanes, or sidewalks?
        - Scoring
            - 0 = Recommendation does not connect to an active transportation facility
            - 1 = Recommendation connects to an active transportation facility at one end
            - 3 = Recommendation connects to an active transportation facility at both ends

    - 5 = Recommendation connects to an accessible, shared use path facility at both ends

b. Proximity to K-12 Schools

- Description: Does the recommendation lie within close proximity to a K-12 public or private school or within ½ mile of multiple schools.

- Scoring
    - 0 = No schools within ½ mile
    - 1 = 1 school within ½ mile
    - 3 = 1 school within ¼ mile or 2 schools within ½ mile
    - 5 = 1 school within 500 feet or 2 schools within ¼ mile

c. Proximity to Public Park or Conservation Land (Qualitative)

- Description: Does the recommendation lie within a ½ mile of a trailhead or accessible entrance to a public park, conservation land, or part of the Across Lexington trail network? Recommendations in close proximity to public parks and conservation lands will receive the highest scores.

- Scoring
    - 0 = No entrance to public park or conservation land within ½ mile
    - 1 = Access point to public park or conservation land within ½ mile
    - 3 = Access point to 2 public parks or conservation lands within ½ mile
    - 5 = Access point to 3 or more public parks or conservation lands within ½ mile

d. Proximity to Transit (MBTA or Lexpress)

- Description: Does the recommendation lie within a ½ mile of public transit route or facility? Recommendations in close proximity to current public transit (MBTA or Lexpress) routes will receive the highest scores.

- Scoring
    - 0 = No public transit route within ½ mile
    - 1 = 1 public transit route within ½ mile
    - 3 = 2 public transit routes within ½ mile
    - 5 = 3 or more public transit routes within ½ mile

3. Design

a. Recommendation Promotes "All Ages and Abilities" by Providing Separation From Motor Vehicles (Qualitative)

- Description: What type of separation from motor vehicles would the recommendation provide? Recommendations with a greater level of separation from motor vehicles will receive the highest scores.

- Scoring
    - 1 = Shared lane

- 3 = New or improved sidewalk, new or improved crosswalk , intersection improvement, or standard striped bike lane
- 5 = New or improved path project or separated bike lane

4. **Economy**
    a. **Proximity to Retail District**
        - Description: Does the recommendation lie within a ½ mile or less of a retail-based business district or full-service grocery store? Recommendations in close proximity to business districts will receive the highest scores.
        - Scoring
            - 0 = Not near a retail district or full-service grocery store
            - 1 = within ½ mile from a retail district or full-service grocery store
            - 3 = within ¼ mile from a retail district or full-service grocery store
            - 5 = within 500 feet from a retail district or full-service grocery store

    b. **Proximity to Key Destinations**
        - Description: Does the recommendation lie within a ¼ mile to 1 mile of a key destination in Lexington? Recommendations will receive the highest scores if they are located in close proximity to any of the following:
            - Lexington Center (includes Town Hall/Cary Hall, Depot Square)
            - Minuteman National Historic Park
            - Battle Green/Belfry Hill
            - Lincoln Park
            - Lexington Community Center
        - Scoring
            - 0 = Not near a key destination
            - 1 = 1 mile from a key destination
            - 3 = ½ mile from a key destination
            - 5 = ¼ mile from a key destination

5. **Feasibility**
    a. **Level of Environmental and Engineering Challenges (Qualitative)**
        - Description: Would the recommendation create significant engineering and/or right of way challenges, require environmental permitting, and/or lead to conflicts with utilities? Any of these would require additional funding, environmental permitting/mitigation, and/or potentially lengthy negotiations with property owners and utility companies.
        - Scoring
            - 1 = Anticipated high level of engineering complexity, such as involving environmental permitting, right of way acquisitions, relocating curbs, drainage, utilities, and/or grade separated paths/bike lanes/crossings

  - 3 = Anticipated modest level of engineering complexity, such as building a new sidewalk, installation or modification of signal infrastructure, or substantial changes in traffic operations
  - 5 = Little to no engineering complexity anticipated, such as road markings, signage, or installation of a solar-powered RRFB

b. Impact to Existing On-Street Parking (Qualitative)

- Description: Would the recommendation remove parking that is heavily utilized (e.g., in a commercial area) or restrict parking where parking is allowed, by rarely used (e.g., in residential areas)?

- Scoring
  - 1 = Linear recommendation removes well-utilized and/or commercial parking on one side of the street
  - 2 = Linear recommendation removes well-utilized and/or commercial parking along a portion of one side of the street
  - 3 = Linear recommendation removes residential parking on both sides of the street where demand is low or inconsistent; crosswalk or intersection project that impacts >2 parking spaces
  - 4 = Linear recommendation removes residential parking on one side of the street where demand is low or inconsistent; crosswalk project that impacts 1-2 parking spaces
  - 5 = Recommendation has no impact on parking

c. Expression of Community Support and/or Safety Concern (Qualitative)

- Description: Location for recommendation received some level of community support[50] and/or was highlighted as a particularly hazardous location during the planning process.
- Scoring
  - 2 = Some level of support expressed
  - 5 = Strong level of support expressed

[50] Note that community support may be neutralized/negated if there is a roughly equal level of opposition

Appendix D Table of Prioritized Projects

Posted on the website:

https://www.lexingtonma.gov/1621/Town-wide-Bicycle-and-Pedestrian-Plan